ARNOLD ARBORETUM
HARVARD UNIVERSITY

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION

VOLUME V
1945

PUBLISHED BY THE
ARNOLD ARBORETUM
JAMAICA PLAIN, MASSACHUSETTS

ILLUSTRATIONS

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 March 30, 1945 NUMBER 1

AN EARLY SPRING

THE temperatures during the past week or two have been unusually high. Yesterday the United States Weather Bureau in Boston announced an all time high for the month of March of 86° F. A letter from Des Moines, Iowa in this morning's mail indicates that the spring is unusually early there and the crab-apples may bloom by April 15. This may also be true in the Arnold Arboretum and if so will be unprecedented. For those who are interested in growing plants —and that is most of us—these temperatures mean two things—a very early spring and the probability of considerable damage to plants in April.

Looking out the window at the Administration Building of the Arnold Arboretum, one easily sees the willow collection. As the buds of the weeping willow swell, they gradually turn from yellow to a yellow green. Then there comes a time, if the weather is unusually warm, when the foliage turns green almost over night. The most striking plant in this collection is a weeping willow tree, which turned green on May 1 last year. This year it turned green March 29.

Spring plowing is being attempted, successfully in some places, today, and many is the Victory gardener who is energetically going over his seeds and playing with the idea of sowing many of them shortly. The experienced gardener will smile at such activity and bide his time. The season is unusually advanced, but there is no promise that it will remain so. Thus it would behoove all gardeners in this area at least to try to control the urge to hasten the regular garden procedure. It should be remembered that on May 18, 19 and 20 of last year there were killing frosts over a very wide area in New England.

Early bloom now in the Arboretum

It is of interest to note that the crocuses, snowdrops and *Adonis amurensis* bloomed at about the same time last year as they did this year, namely about March 20. Immediately following the bloom last year, there was a long cold

spell. *Magnolia stellata* did not bloom until May 1 and, as already mentioned, the weeping willow did not turn green until the same date. Now, however, the willow is green, and *Magnolia stellata* will be in full bloom on Easter Sunday, April 1, a full month earlier than last year. Over a long period of years the average blooming date of *Magnolia stellata* is about April 15. It should be noted in this same connection, however, that although the daily temperatures may not have averaged as high in 1936 as they are in 1945, nevertheless many of the woody plants that are in bloom in March of this year, also bloomed in March, 1936. The spring was unusually early both years.

Skunk cabbage is now in flower, as well as some of the poplars and pussy willows. Special mention should be made of *Forsythia ovata*. This is the first of the forsythias to flower, and some of the plants in open places in the Arboretum are now in full bloom. It must be admitted, however, that there will not be the usual ten day lapse between the time this species flowers and the time that *Forsythia intermedia spectabilis* blooms, for many of these plants are showing a great deal of color in their buds now, and some should be in full bloom on Easter Sunday.

Prunus Davidiana was in full bloom at least two days ago. This is the first of all the Prunus tribe to flower in the spring. *Abeliophyllum distichum* should still be in full bloom the first of next week. Its many small white flowers on the long arching branches make it an outstanding shrub for early spring effect, and south of New York City, it is likely that the flowers would not be nipped by late frosts, as so frequently happens in the Arnold Arboretum.

The witch hazels have, of course, been in full flower for some weeks. All have good flowers this year. The closely related *Corylopsis* species are barely starting to show the yellow color in their flower buds, but soon should be in full bloom. *Lonicera praeflorens* was in full flower several days ago.

Rhododendron dauricum and *R. mucronulatum* are in full bloom today. Their purplish pink flowers are very much alike as far as color is concerned, but *R. mucronulatum* is much the better plant in this climate for it is hardier and flowers much more freely. Although it is a true rhododendron, it is frequently thought of as an azalea for it drops its leaves in the winter and to all intents and purposes functions as an azalea in the garden. These two plants are the first of all the woody plants to display flowers of this color, and so are valued.

Finally, the Japanese cornelian cherry (*Cornus officinalis*) will be in full flower tomorrow and will be followed in a few days by the cornelian cherry (*C. mas*). If this weather keeps up a few more days, many other shrubs will be forced rapidly into premature bloom. The flowers of many of these can easily be killed by a frost, which at this time of year should be expected at almost any time.

Winter Injury

Very little winter injury has occurred due to low temperatures this year. However, the very heavy snowfall of February 8 caused a great deal of damage. This

snow was rather wet and froze somewhat to the branches of many trees and shrubs, bending many practically to the ground. Of course, this was responsible for some breakage. The day after the storm, while the snow and ice were still on the trees, a wind prevailed for a short period but unfortunately long enough to cause heavy damage. It is estimated that this one storm alone caused so much breakage in the Arnold Arboretum that it wlll take our entire force at least three weeks properly to prune the trees injured by it. In visiting the Arboretum this spring, please keep this in mind for it will be impossible to clear away all signs of damage done by this storm in time for the big spring flower displays.

DONALD WYMAN

Notes

It was with sincere regret that we announced last fall the death of the Superintendent, Mr. Louis Victor Schmitt, on November 16, 1944. News releases were issued at the time, but no mention was made in the final issue of Arnoldia for 1944. Mr. Schmitt came to the Arnold Arboretum in 1905 and served long and well, eventually being appointed as Superintendent. His position has been filled since the first of this year by Mr. Robert G. Williams, who came here from his position as Superintendent of Parks in Greensboro, North Carolina. Mr. Williams is a graduate of Cornell University, and is well prepared for the work in the Arboretum. Full announcements were made in the horticultural papers at the time of his appointment.

The Veitch Memorial gold medal of the Royal Horticultural Society in London has been awarded to Mr. William H. Judd, propagator of the Arnold Arboretum, for his excellent work in propagation. This is an award made each year to persons who have distinguished themselves along horticultural lines. Mr. Judd has been on the staff of the Arnold Arboretum ever since he came to this country from England in 1913, since which time a very great amount of new material has been introduced by the Arnold Arboretum. This has necessitated a rather complete knowledge of propagation. Mr. Judd hopes to be able to go to England shortly after the war in order to receive this medal in person.

Book Review

Betts, E. M. Thomas Jefferson's Garden Book, 1766–1824, with Relevant Extracts from His Other Writings. i–xvi. 1–704. pl. 1–36. 1944 (Mem. American Philos. Soc. Philadelphia, vol. 22). Price $5.00.— The basis of this interesting document is the original Jefferson manuscript which was purchased, among other papers, by Jefferson's great-grandson, Thomas Jefferson Coolidge of Boston, and by him presented to the Massachusetts Historical Society, June 9, 1898. It contains the most varied entries of all of Jefferson's memorandum books. It was started as a diary of garden observations but became a written repository for numerous other Jeffersonian interests. As he states in a letter addressed to Charles Willson Peale, August 20, 1811: "No occupation is so delightful to me as the culture of the earth, and no culture is comparable to that of a garden." The volume is replete with very numerous entries appertaining not only to agriculture and horticulture but to a multitude of the author's other remarkably wide interests. As the editor states: "Here is revealed what was probably the most absorbing of all the interests of one who was the foremost philosopher of his time, Governor of Virginia, Secretary of State in Washington's cabinet, Vice President and President of the United States, President of the American Philosophical Society for eighteen years, and founder of the University of Virginia," and, it may be added, author of the Declaration of Independence. Very many of Jefferson's letters to a wide circle of correspondents are reproduced. The volume is well documented, provided with an ample bibliography, and a comprehensive index. This outstanding book is highly recommended to all individuals who may be interested in this very remarkable man, and especially to that increasingly wide public that is intrigued with plants, their culture, and the time of introduction of various types into cultivation in the United States.

E. D. Merrill

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 | April 6, 1945 | NUMBERS 2–3

BUILD BIRD POPULATION WITH FOOD PLANTS

BIRD-LIFE is an essential feature of every attractive landscape. Not only the town garden and lawn, but the farmstead with its fence rows and hedges, its fields and woodland edges, has its interest heightened by the color, the activity, and the song of our native birds. And the charm of these feathered citizens lies not only in their beauty, but in the hard, cold fact that they benefit the townsman and the farmer economically through their destruction of harmful ininsects and weed seeds. They serve to maintain balance in nature by keeping in check grasshoppers, gypsy moths, tent caterpillars and rodents, the over-population of any one of which might drive man from great areas of the earth. By the consumption of millions of weed seeds they also reduce the competition of weeds with cultivated plants.

The most interesting way to attract a greater population of birds about the home is to plant trees and shrubs especially attractive to them. Such plants may provide escape cover, in which birds may take refuge from their enemies or from storms; nesting cover, which furnishes the right type of support for young birds' cradles; or winter cover, represented by the conifers and most important where the ground is long covered with snow. If a cover, in addition to any of the above uses, will serve to provide bird food—mainly as seeds or fruits, but for some birds as buds or leaves or bark—such trees and shrubs serve doubly well.

Shrubs and trees of special value to birds, as well as to mammals, may well be selected for fence rows and windbreaks, for woodland edges, for border plantings about the home lot and for foundation plantings around the house. Through the use of certain varieties—many of them well-adapted native species, others easily grown exotics—there may be a succession of food for wildlife through much of the year, at the same time providing beauty of bloom and leaf and interest through fruits or seed pods.

Various writers have listed fully a hundred trees and shrubs that are of value

to birds as food plants. Experience at the Arnold Arboretum could doubtless add many other species and varieties. However, we will consider here mainly those in more common use, which are easily secured from nurseries or taken from surplus woodland growths.

For many years the Moose Hill Sanctuary of the Massachusetts Audubon Society at Sharon, Massachusetts, has kept records of fifty varieties of fruit-bearing trees and shrubs planted especially to attract bird-life. Of this number, Superintendent William A. Taylor has selected ten that are particularly desirable, not because all of them are favorites of the birds, but because these plants are most likely to meet the birds' requirements in that section throughout the twelve months of the year. The ten most highly recommended are:

For summer and early autumn

Tatarian Honeysuckle (*Lonicera tatarica*)
Buckthorn (*Rhamnus caroliniana* or *R. cathartica*)
Red Mulberry (*Morus rubra*)
Gray Dogwood (*Cornus racemosa*)
Redosier Dogwood (*Cornus stolonifera*)

For late autumn and winter

Arrowwood Viburnum (*Viburnum dentatum*)
Common Winterberry (*Ilex verticillata*)
Mountain Ash (*Sorbus americana* or *S. aucuparia*)
Flowering Crab (*Malus floribunda*)
Japanese Barberry (*Berberis Thunbergii*)

These and a number of other varieties are briefly discussed in the following paragraphs, to allow a wide choice where one must consider the space available for planting, the condition of the soil, location as to sun or shade, and other factors that effect plant growth. Peculiarly enough, reports from many observers who have kept records on the fruits most favored by birds for food indicate that in one locality a number of birds may rapidly clean off the fruits of a certain tree or shrub, while in another locality the same fruit may go through the season almost untouched. Native species of plants are labeled (N), while introduced or exotic species are labeled (E), and the approximate height to which the plants grow is also indicated.

These Trees are Useful as Summer and Autumn Foods

The Oaks, such as White Oak (*Quercus alba*) (N: 40 to 60 ft.) and Red Oak (*Quercus rubra*) (N: 50 to 60 ft.) provide acorns that furnish food to many birds, including Jays, Woodpeckers and Nuthatches, as well as to Squirrels and Chipmunks.

The fruit of the Hackberry (*Celtis occidentalis*) (N: 40 ft.), maturing in September and October, is eaten by forty species, while the Sassafras (*Sassafras albidum*) (N: 20 ft.) may be grown as a small tree or, through cutting back, will

PLATE I (*Courtesy Henry B. Kane*)

The Cedar Waxwing is so fond of fruit that it has been called the Cherry Bird. During the nesting season, you will find these birds carrying the small wild red and black cherries, as well as fruit of the bush honeysuckle, to their young.

form a shrubby copse. In landscaping it is valued for its brilliant autumn foliage, and the dark blue fruit on red stems attracts birds ranging from the Bob-white to the Crested Flycatcher.

The Sour Gum or Black Tupelo (*Nyssa sylvatica*) (N : 50 ft.), with its crimson leaves in the autumn and blue-black fruit, may encourage visits not only from Waxwings, Thrushes and Blue Jays, but even from Wood Ducks and Ring-necked Pheasants.

The American Elm (*Ulmus americana*) (N : 60 ft.) should not be overlooked, for in addition to its edible, winged nutlet, it furnishes the ideal site for the nesting of the Baltimore Oriole.

The White Ash (*Fraxinus americana*) (N : 50 ft.) is planted for its seeds, which are liked by the Pine Grosbeaks, favorites among the scarcer winter Finches that appear in New England. Even the Sugar Maple (*Acer saccharum*) (N : 50 ft.) has its part in furnishing seed to bird and mammal life.

The Cherries have fruits that are favorites of many birds, more than seventy species feasting on them. The wild cherries are even more popular with birds than the cultivated varieties, although they should not be planted where live stock may reach them, as their leaves often prove poisonous to animals. The Wild Red Cherry or Pin Cherry (*Prunus pensylvanica*) (N : 35 ft.) produces its white flowers and small red fruits in early summer, while the Black Cherry (*P. serotina*) (N : 50 ft.), with purple-black fruit, follows the Red Cherry in season.

The Red Mulberry (*Morus rubra*) (N : 50 ft.) and the White Mulberry (*M. alba*) (E : 30 ft.) are not particular as to soil and will endure partial shade. Though a limited fruiting season detracts somewhat from their value, during late June and July they attract a great number of birds. Many bird-watchers have stated that if they could choose only one fruiting tree to attract birds, they would select the Mulberry. Fifty-nine species of birds are known to feed on Mulberry fruit. These include the Yellow-billed Cuckoo, Kingbird, Tree Swallow, Scarlet Tanager, Waxwing, Vireos, Catbird, Thrasher, Thrushes, Purple Finch and the Warblers. The variety *tatarica*, of Russian origin, is a smaller, hardier tree, worthy of trial. Staminate and pistillate flowers of Mulberry may be on the same tree but not infrequently are on separate trees, and in the latter case both types of plants are needed to ensure fruit production.

Shrubs Furnish much Fruit for Summer and Fall

Blackberry and Raspberry (*Rubus* sp.) (N : 3–5 ft.). For a tangle in a corner of the garden, these fruits are unexcelled for bird food, over a hundred species being known to eat them, and their brambles make fine nesting spots and good escape cover for Indigo Bunting, Catbird, Brown Thrasher, and many others.

Blueberry (*Vaccinium* sp.) (N : 2–6 ft.) and Huckleberry (*Gaylussacia* sp.) (N : 2–6 ft.), thriving mainly on acid soil and producing most acceptable berries in late summer and autumn, are attractive to such birds as Ruffed Grouse, Kingbird, Oriole, Chewink, Catbird, Thrasher, Thrushes, Chickadee and Waxwing.

Buckthorn (*Rhamnus caroliniana*) (N : 6–10 ft.) and *R. cathartica* (E : 6–10 ft.), the former with red fruit that turns black, the latter with shiny black fruit, are also valuable. The former's extended period of fruiting adds to its value, for, starting to ripen in July, it continues through the summer and is available for food until the autumn frost. Buckthorn is not recommended, however, in sections where oats are grown, as it harbors oat rust.

Of the shrub Dogwoods (*Cornus* sp.), the Gray Dogwood (*Cornus racemosa*) (N : 5–6 ft.) and the Redosier (*C. stolonifera*) (N : 5–6 ft.) have excelled at Moose Hill Sanctuary as bird fare. The flowers of both are small, in clusters, and attractive. The fruit of the Gray Dogwood is greenish, the size of small peas, in close, small bunches on crimson stems. The fruit of the Redosier is lead-gray, black-dotted and in clusters, while its brilliant bark lends color to the snowy scenes of winter. The Silky Dogwood (*C. Amomum*) (N : 6–8 ft.), with grayish-purple bark and clusters of pale blue berries, is particularly good for planting in wet places and for woodland edges, since it requires little care. It has given excellent results in attracting birds at Arcadia Wildlife Sanctuary in Northampton, Massachusetts. The Pagoda Dogwood (*C. alternifolia*) (N : 10–15 ft.) is indifferent as to soil, and its yellowish fruits are quickly gathered by several species of birds, including the Crested Flycatcher. The Flowering Dogwood (*C. florida*) (N : 15–20 ft.), a well-known small tree, has greenish-yellow flowers surrounded by showy white bracts three inches across. The foliage turns a rich crimson in the autumn, and the berries are a brilliant scarlet. The Kousa Dogwood (*C. kousa*) (E : 15 ft.) follows the *C. florida* in blooming season. It has very attractive flowers and equally brilliant fruit. Eighty-six species of birds are known to feed upon Dogwood berries, and because of their time of production they are available for, and of special value to, fall migrants. Robins and other Thrushes quickly clean them up as they move southward for the winter.

American Elder (*Sambucus canadensis*) (N : 8–10 ft.) is a coarse, rank-growing shrub, often overlooked because of its very commonness. It is a great producer in the late summer of heavy clusters of black berries, which are eaten by a hundred species of birds, including Flickers and other Woodpeckers, Bluebirds and Thrushes. The Elder proves more attractive to birds than some of our finest cultivated fruits, such as grapes and raspberries, so that it may be successfully used as a lure crop to draw the birds away from the more valuable fruits. The Scarlet Elder (*Sambucus pubens*) (N : 8–12 ft.), with its conspicuous clusters of scarlet berries, is more colorful than the American Elder and, within its range, is just as great a bird attraction.

Sapphireberry Sweetleaf (*Symplocos paniculata*) (E : 5–7 ft.) produces most attractive clusters of sapphire blue berries in the autumn. However, the birds are so eager for these fruits that most of them never get a chance to ripen. It has proved one of the best bird food plants at the Roosevelt Bird Sanctuary, Long Island, and is being used successfully in Massachusetts.

Shadbush or Serviceberry (*Amelanchier canadensis*) (N: 10–15 ft.). A shrub or small tree, garlanded in white flowers in May, has small, purple, applelike fruits which are so popular with birds like Orioles, Waxwings, Flickers and Thrushes that they do not last long after ripening.

Spicebush (*Lindera Benzoin*) (N: 8–10 ft.) is valued for its handsome yellow flowers that cover the branches before the leaves unfold in early spring, while in autumn the foliage turns bright yellow and the conspicuous scarlet fruits are eaten by many fall migrants as well as resident birds.

Strawberry Bush or Euonymus (*Euonymus americana*) (N: 8 ft.). The flowers of this shrub are inconspicuous, but the salmon pink fruit is interesting and supplies food in the autumn for Scarlet Tanager, Sapsucker and Thrushes.

Tatarian Honeysuckle (*Lonicera tatarica*) (E: 6–8 ft.). This easily grown shrub has pink and white flowers in May and June, followed by bright red or yellow fruit that proves most attractive to summering Thrushes, Thrashers, Catbirds and Waxwings, as well as to White-throated Sparrows and Purple Finches.

Trees Supply Some Winter Needs

Red Cedar (*Juniperus virginiana*) (N: 25 ft.). is a well-known evergreen that serves a triple purpose for birds. The foliage is so dense as to make excellent cover and a desirable nesting site for many species. The blue fruits are attractive in winter to Evening and Pine Grosbeaks and the Purple Finch, as well as to lingering Cedar Waxwing and Myrtle Warbler, and they are an aid to early spring arrivals like Bluebird, Phoebe, Robin and Tree Swallow. Over fifty species of birds are said to enjoy the Red Cedar fruits. The tree should not be planted where there are apple orchards, as it serves as an alternate host for the Cedar-apple rust. Although the Oldfield Common Juniper (*Juniperus communis depressa*) (N: 1–3 ft.) is considered a pest plant in many sections, it does serve its purpose in covering poor, waste lands, and its blue berries, like those of Red Cedar, are liked by many birds.

Canada Hemlock (*Tsuga canadensis*) (N: 60 ft.) has seeds which are eaten by the winter Finches that we try so hard to bring to our gardens—the Grosbeaks, Crossbills and Pine Siskin—as well as by the Red-breasted Nuthatch, Chickadee, Junco, White-crowned and White-throated Sparrows.

The Pitch Pine (*Pinus rigida*) (N: 30 ft.) and the White Pine (*P. Strobus*) (N: 50–75 ft.), both grown easily in this state, have cones that are sought by over sixty kinds of birds, as well as by squirrels.

The Birches are so well adapted to Massachusetts that there is usually room for these small trees in a garden of moderate size. Plant a group of Gray Birch (*Betula populifolia*) (N: 30 ft.), one of the larger, graceful Paper Birch (*B. papyrifera*) (N: 90–100 ft.), or, near a pool or small stream, the Yellow Birch (*B. lutea*) (N: 40 ft.) or the Sweet Birch (*B. lenta*) (N: 60–70 ft.). These trees carry in their small cones a supply of tiny seeds that the winter Finches—Goldfinch,

PLATE II

Winterberry (*Ilex verticillata*) a deciduous holly with red berries in the fall and early winter. The sexes are separate and both staminate and pistillate plants should be near each other to insure fruiting.

Siskin and Redpolls—will search for. The Birches are also very attractive to Warblers during migration because of small insects, such as aphis, which feed on the foliage.

The Mountain Ash (*Sorbus americana*) (N: 20–30 ft.) and *S. aucuparia* (E: 20–30 ft.) are ornamental small trees. The broad, flat-topped clusters of white flowers are followed by bright, crowded, shining-red to orange fruit clusters that persist well into the winter and are favorites of the Waxwing, Oriole, Catbird, Robin and Thrasher. The American form is said to be more resistant to disease than the introduced species from Europe, but the latter is not so particular as to soil and has larger fruit clusters.

The Flowering Crab (*Malus floribunda*) (E: 10–15 ft.) is a small tree, to be planted in an open, sunny well-drained location. It bears attractive, rose-colored blossoms freely in May. The bright red fruit, the size of peas, borne on long, slender stalks, is in winter a favorite of Mockingbird, Cedar Waxwing and northern Finches like the Pine Grosbeak, Purple Finch and Red Crossbill, as well as of the Ruffed Grouse. The same birds will also welcome the yellow and red waxy apples of the Siberian Crab (*M. baccata*) (E: 40 ft.), which is more resistant to disease than our native Crabapples.

The Hawthorns form dense, thorny growth, making an almost impenetrable hedge. The white blossoms are produced in May. The leaves are dark and glossy, some species turning brilliant scarlet in autumn to match the applelike fruit. All the plants of this group require a sunny location and prefer a soil that is not acid. The fruit lasts well into the winter and, when softened by frost, furnishes good food for Grouse and winter Finches like the Pine Grosbeak, as well as for hungry spring Robins. Cockspur Thorn (*Crataegus crus-galli*) (N: 20 ft.), Washington Hawthorn (*C. Phaenopyrum*) (N: 20 ft.), Arnold Hawthorn (*C. arnoldiana*) (N: 20 ft.), and English Hawthorn (*C. Oxyacantha*) (E: 20 ft.) are four of the best.

Boxelder or Ash-leaved Maple (*Acer Negundo*) (N: 60 ft.) is a fast-growing tree that furnishes good shade, but the wood is brittle and the shape of the tree is poor. However, the winged fruits are particularly attractive to the Evening Grosbeak, a bird in demand at every feeding station in New England, though they appear in numbers only in occasional winters. Only the pistillate plants of the Boxelder bear fruits.

Amur Corktree (*Phellodendron amurense*) (E: 20–30 ft.), with its raisinlike clusters of fruits, has been noted in the Arnold Arboretum as a life-saving food of early returning Robins and Bluebirds that have been caught in a spring snowstorm, as well as of wintering Waxwings.

Many Shrubs Furnish Fruit for Cold Months

The Common Winterberry (*Ilex verticillata*) (N: 6 ft.) is a shrub of open type growth that prefers moist soil but will grow under many conditions. The white flowers in June are inconspicuous, but the brilliant orange-scarlet fruit in scat-

PLATE III

Mountain Ash (*Sorbus americana*). Always attractive to the birds in early fall.

tered clusters may continue on the bare branches until midwinter and form a food supply for Grouse, Quail and possible wintering Thrasher, Catbird or Waxwing. Forty-eight species are said to eat its berries. American Holly (*Ilex opaca*) (N: 6–8 ft.), the Christmas Holly, is of value for its shining, evergreen, spiny leaves, as well as for its red berries as winter bird food. In the Cape Cod area of Massachusetts, the Holly supports a considerable population of wintering Robins, as well as other species. Along the coastal area, the Inkberry (*Ilex glabra*) (N: 4–6 ft.), an evergreen that thrives best on acid soil and produces abundant crops of black berries, may be recommended. Also, for the seacoast, the Bayberry (*Myrica pensylvanica*) (N: 6–8 ft.) with its gray berries, will be a boon to wintering Myrtle Warbler, Carolina Wren or Hermit Thrush.

Black Chokeberry (*Aronia melanocarpa*) (N: 4–6 ft.) and Red Chokeberry (*Aronia arbutifolia*) (N: 8–10 ft.) grow best in low, moist, acid soil. White flowers are produced in April or May, followed by fruit in profusion in the autumn, lasting well into the winter and attractive to many birds, including Meadowlark, Bob-white and Ruffed Grouse.

The Viburnums. Nearly all of the berry-producing Viburnums are considered desirable for birds, but the Arrowwood Viburnum (*Viburnum dentatum*) (N: 6–10 ft.) seems to be the favorite. Like many of this family, it tolerates shade and can therefore be planted under trees. It has white flowers in small heads and slate-blue fruit that becomes almost black in ripening. Sheepberry or Nannyberry (*V. lentago*) (N: 8–10 ft.) has cadet-blue berries. The flat, creamy white flower heads of the Withe Rod (*V. cassinoides*) (N: 6–8 ft.) are followed by varicolored berries, while the American Cranberrybush (*V. trilobum*) (N: 8 ft.) furnishes showy white blooms, brilliant autumn coloring of foliage and scarlet berries. The Mapleleaf Viburnum (*V. acerifolium*) (N: 4–5 ft.) will endure much shade and is attractive throughout the year with its yellowish-white flowers, shapely leaves that turn purple in the autumn and showy blackish fruits. The Blackhaw Viburnum (*V. prunifolium*) (N: 10–15 ft.), a thrifty grower, is not particular as to soil and furnishes abundant bird food. All the Viburnums bloom in May and June, and their attractive fruits, though maturing rather early in the autumn, will hang well through the winter and prove desirable food for thirty-five species of birds, including the Rose-breasted Grosbeak, Purple Finch, Pine Grosbeak, Ruffed Grouse, Flicker, Waxwing, Robin, Bluebird, Thrasher and Catbird.

Japanese Barberry (*Berberis Thunbergii*) (E: 3–5 ft.) is a shrub that has inconspicuous yellow blooms in June and bright red foliage and berries in the autumn, the latter lasting well into the winter. The fruit is eaten little by summer resident or fall migrant, and therein lies its value. During "time of famine," when most other fruits are eaten, snow-covered or decayed, these berries become life-saving food for soft-billed birds that may be wintering in the North, as well as for early spring migrants that are caught in the snowstorms of March and April. At Moose Hill, they are also eaten through the winter by the Ruffed Grouse. A thorny

hedge of *Berberis Thunbergii* is likewise a protection from bird enemies and an excellent nesting location for Song Sparrows and Catbirds.

The European Barberry (*Berberis vulgaris*) (E: 6–8 ft.), which has escaped from cultivation and is found in many thickets and along country roads in Massachusetts, produces long clusters of bright red berries that make a delicious jelly when combined with crab apple, and the birds, perhaps recognizing their good flavor, feast upon them in late fall and winter. The plant is not recommended in wheat-farming sections, since it harbors the wheat rust.

The Chokecherry (*Prunus virginiana*) (N: 8–10 ft.), with its attractive white flowers in spring and dark red fruit, provides a good nesting place for birds, but the plant is in disrepute because of its susceptibility to the black knot disease. The Chokecherry and the shrubby Beach Plum (*P. maritima*) (N: 4–5 ft.) that grows so well on Martha's Vineyard, Nantucket and Plum Island, are both adapted to the sandy, acid soil along the coast. The fruit of the latter makes a most delectable jelly and is also eaten by the birds.

Coralberry (*Symphoricarpos orbiculatus*) (N: 3–4 ft.), also known as Indian Currant, is especially good for banks and dry spots where low growth is wanted. The pink flowers in July are followed by racemes of currantlike red fruit for autumn and winter feeding of Purple Finches and Grosbeaks, which birds also will occasionally take the snow-white fruit of the Snowberry (*S. albus*) (N: 4–5 ft.).

European Privet (*Ligustrum vulgare*) (E: 6–8 ft.) and Ibota Privet (*Ligustrum ibota*) (E: 5–6 ft.), so commonly used for hedge plants, should be mentioned, as their black berries, persisting through the winter, furnish food for Ruffed Grouse, as well as for other birds, and these plants will grow on almost any soil and will endure the unfavorable conditions that exist in many cities.

Rugosa Rose (*Rosa rugosa*) (E: 3 ft.), as well as native roses like the Carolina Rose (*R. carolina*) (N: 3 ft.), Virginia Rose (*R. virginiana*) (N: 3–4 ft.) and the Swamp Rose (*R. palustris*) (N: 6 ft.), whose hips persist through the cold weather, will often prove acceptable to the Ruffed Grouse, Bob-white, Purple Finch and Bluebird.

Japanese Rose (*Rosa multiflora*) (E), a climber, is highly recommended by the Soil Conservation Service as wild-life escape and nesting cover and as a natural fence along the edge of field and woodland.

The Staghorn Sumach (*Rhus typhina*) (N: 20 ft.), also the Flameleaf Sumach (*R. copallina*) (N: 15 ft.) and the Smooth Sumach (*R. glabra*) (N: 15 ft.) furnish last-resort food that will be picked up in the spring by many birds when their other food supplies are exhausted. Woodpeckers, Chickadees, Blue Jays, Sparrows and early-arriving Phoebes and Hermit Thrushes may partake of the Sumach berries. The Sumach helps Flickers to subsist in winter in coastal areas like Cape Ann. It has also been noticed that fall-migrating Hermit Thrushes and Robins linger in the Sumach thickets to feed on the berries, so these are not altogether a food of last resort.

Recent information from eastern Massachusetts lists the Golden St. Johnswort (*Hypericum frondosum*) (E: 2–3 ft.) as a most successful shrub for bird feeding. The seeds which remain on the plant through the winter are held two or three feet above the ground, where Juncos and Tree Sparrows can get them after all but the deepest snows. The golden flowers add vivid color to the garden.

Many Vines will Produce Bird Food

Old stone walls, unsightly poles and trellises may be covered with vines that produce berries attractive to birds. Even the Poison Ivy (*Rhus toxicodendron*) berries are eaten by birds, though this of course, is not recommended for planting. Among the most desirable vines for bird foods are:

American Bittersweet (*Celastrus scandens*) (N). A well-known, shrubby vine that will thrive in either sun or shade. The interesting orange and red capsuled fruit produced in the autumn is food for Pheasants, Grouse and Quail, as well as Thrushes and Vireos.

Native Grapes, such as Summer Grape (*Vitis aestivalis*) and Frost Grape (*V. vulpina*), are desirable for bird food, their use depending largely on suitable space for planting.

Greenbrier (*Smilax rotundifolia*) (N). A partially-evergreen, thorny vine that makes excellent cover, while the bluish-black fruits are desirable food for many kinds of birds, such as Thrushes, Catbird and Brown Thrasher.

Trumpet Honeysuckle (*Lonicera sempervirens*) (N), with its orange-scarlet flowers, will attract the Hummingbirds during the summer, while its red fruit is eaten in the autumn by Thrushes, Catbird and Bob-white. The Hall's Japanese Honeysuckle (*L. japonica Halliana*) (E), Morrow Honeysuckle (*L. Morrowii*) (E) and Amur Honeysuckle (*L. Maackii*) (E) are of similar value to the birds.

Virginia Creeper (*Parthenocissus quinquefolia*) (N), known also as the Five-leaved Ivy, clings well to garden walls, has brilliant foliage in the autumn, and black fruits that prove acceptable to Robin, Bluebird and other Thrushes, Tanager, Mockingbird, Purple Finch, Myrtle Warbler, Woodpeckers and the Pine Grosbeak.

Ground Covers Are of Value Too

In the shade of many shrubs and trees there is opportunity to use ground-covering plants, the fruit of which will also prove a boon to birds through certain seasons of the year. The Bearberry (*Arctostaphylos uva-ursi*) (N) is a creeping, evergreen shrub, growing only a few inches high and thriving in acid soil in semi-shade. The urn-shaped flowers are pinkish-white, and the red fruit, which may persist until spring, is eaten by Fox Sparrow and Ruffed Grouse. The Partridge-berry (*Mitchella repens*) (N), an evergreen trailer well known in our woodlands, has fragrant white flowers and red berries, is more tolerant as to soil than the Bearberry, and is a particular food of the Ruffed Grouse. Checkerberry Wintergreen (*Gaultheria procumbens*) (N), needing acid soil, is rather upright in growth, though reaching a height of only four inches. The foliage is evergreen and shiny

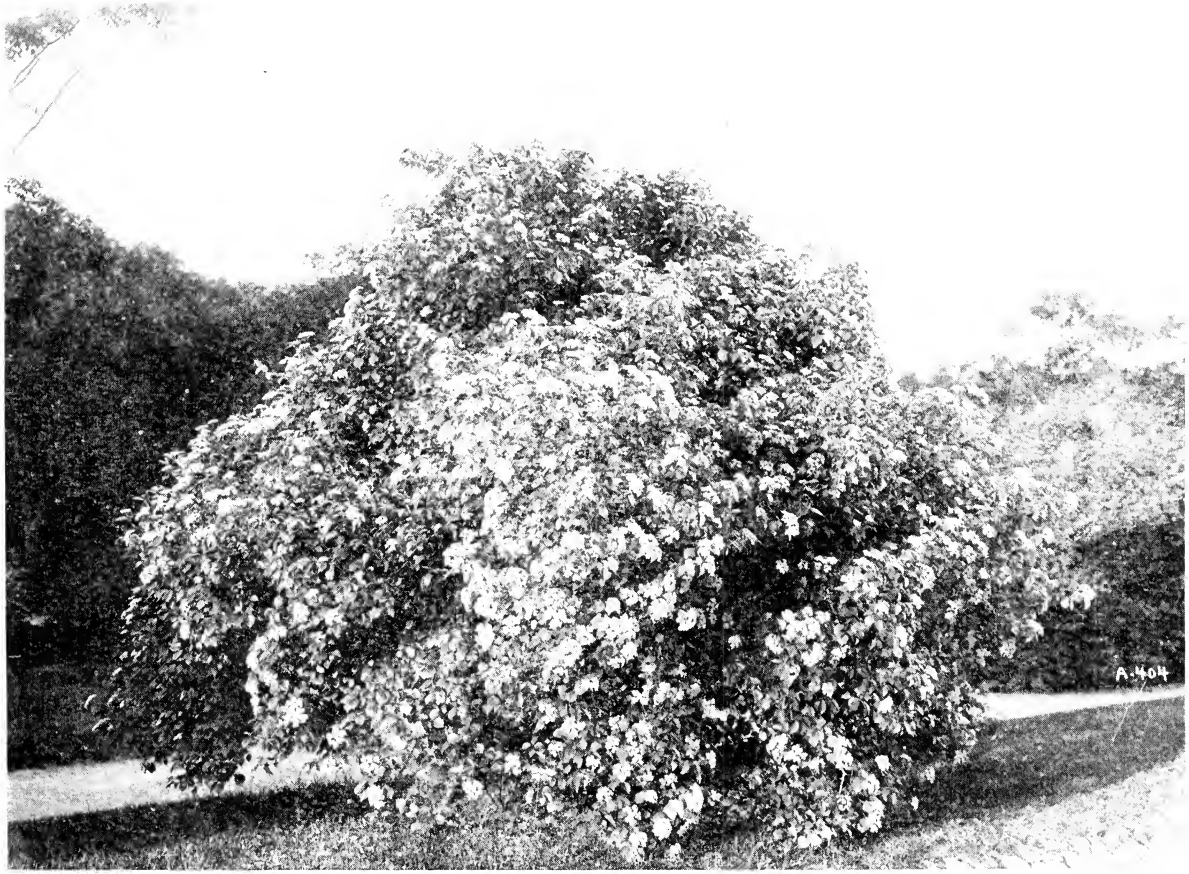


PLATE IV

Most of the viburnums prove attractive to the birds when in fruit. This is the Arrowwood (*Viburnum dentatum*) in flower.

and the scarlet berries have a decided wintergreen flavor. The Virginia Strawberry (*Fragaria virginiana*) (N) is liked by more than fifty species of birds, including the Towhee and the Wood Thrush. A thick carpet of this plant should by all means be included in the bird garden to produce June fruit.

The red fruits of the Bunchberry (*Cornus canadensis*) (N) are a good food for the Ruffed Grouse and other ground-feeding birds, while its tiny flowers surrounded by showy white bracts make this four-inch-high plant a veritable miniature flowering dogwood. Canada Beadruby (*Maianthemum canadense*) (N), known also as Canada Mayflower and False Lily-of-the-Valley, is easily grown in moist soil in the shade. Following its small, white flowers, greenish fruit which turns dull red will be eaten by Pheasant, Grouse and Thrush.

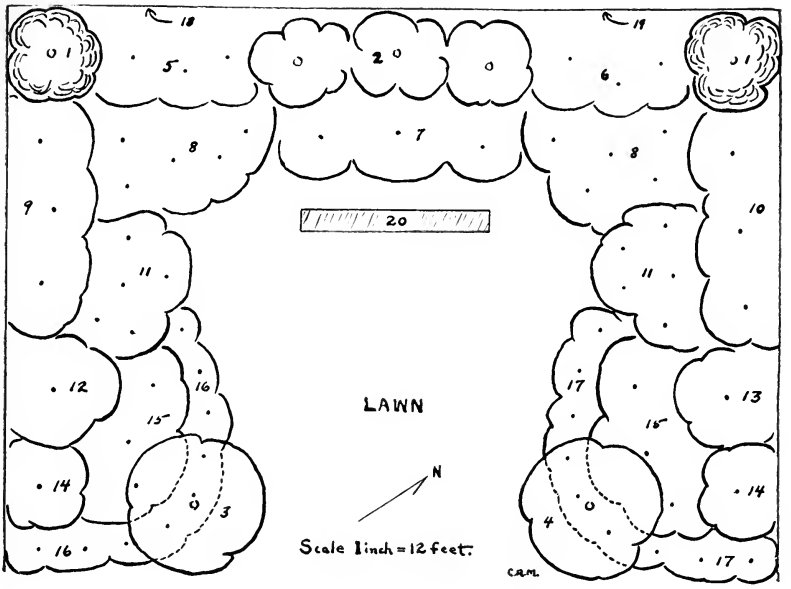
Herbaceous Perennials and Annual Flowers Have a Place

A vigorous herbaceous perennial that is found in many a neglected spot where its seed has been sown by birds is worthy of attention. It is the Common Pokeberry (*Phytolacca americana*) (N: 6-12 ft.). The long clusters of purple berries, which in earlier times had use in ink-making, are eaten by many species of birds, including Mourning Dove, Flicker, Kingbird and other Flycatchers and members of the Mockingbird and Thrush families. Delphinium (many species), Oswego Beebalm (*Monarda didyma*) and Cardinal Flower (*Lobelia cardinalis*) among perennials and the annual Scarlet Sage (*Salvia splendens*) are flowers which most easily attract to the garden that flashing jewel, the Hummingbird, though Phlox and Gladioli seem to serve equally well in some localities. The fondness of Goldfinches for Sunflowers (*Helianthus species*) is taken advantage of by California seed growers who plant rows of this plant to draw the hungry birds away from the rarer plants being grown for seed production. Zinnias, Bachelor's-buttons, Coreopsis, Cosmos, Petunias and Asters of many kinds, if allowed to produce seed in the cutting garden, will furnish food for the Finch or Sparrow family, and many of these plants will hold their seed pods above the snow to help the birds through the winter months.

A spare corner of the garden may also be devoted to growing a mixture of seed like sunflower, buckwheat and millet, to serve as pasturage for the flocks of Whitethroats and other Sparrows, Buntings and Finches as they migrate southward in the fall and when they return to their nesting grounds in the spring.

You May Have a Bird Thicket Even on a Small Lot

The size of your property is not particularly a limiting factor so far as attracting birds is concerned. Investigation in farming areas has shown that the greatest population of birds occurs where woodland edges merge with open country and along the overgrown fence rows. Such conditions are practically duplicated in a border planting of shrubs and small trees that surround the lawn of a town lot, as illustrated here. There are endless variations of such a plan that may be worked out according to the desires of the individual, keeping in mind always a succession of fruits for the birds through the greater part of the year.



Planting Key

1. **Red Cedar** (*Juniperus virginiana*)
2. **Gray Birch** (*Betula populifolia*)
3. **Flowering Dogwood** (*Cornus florida*)
4. **Flowering Crab** (*Malus floribunda*)
5. **Arrowwood Viburnum** (*Viburnum dentatum*)
6. **Spicebush** (*Lindera Benzoin*) or **Buckthorn** (*Rhamnus caroliniana*)
7. **Redosier Dogwood** (*Cornus stolonifera*)
8. **Gray Dogwood** (*Cornus racemosa*) or **Silky Dogwood** (*C. Amomum*)
9. **Common Winterberry** (*Ilex verticillata*)
10. **American Cranberrybush** (*Viburnum trilobum*) or **Sapphireberry** (*Symplocos paniculata*)
11. **Mapleleaf Viburnum** (*Viburnum acerifolium*)
12. **Washington Hawthorn** (*Crataegus Phaenopyrum*)
13. **Arnold Hawthorn** (*Crataegus arnoldiana*)
14. **Tatarian Honeysuckle** (*Lonicera tatarica*)
15. **Japanese Barberry** (*Berberis Thunbergii*)
16. **Coralberry** (*Symphoricarpos orbiculatus*)
17. **Rugosa Rose** (*Rosa rugosa*)
18. **Virginia Creeper** (*Parthenocissus quinquefolia*) } over fence or
19. **Bittersweet** (*Celastrus scandens*) } stone wall
20. Suitable location for Feeding Station or Bird Bath.

Ground cover of **Virginia Strawberry** (*Fragaria virginiana*) and **Partridgeberry** (*Mitchella repens*) under trees and taller shrubs.

It is impossible in an article of this length to cover all of the plants that are attractive to birds because of their fruits or seeds. There has been no attempt made to include the waterfowl to any degree. Rather, the material has been confined to better known plants that may be used in limited space as well as on extensive estates. It is hoped that all who read it may say: "Why has the author not included that shrub that we find the Finches like so much?" or "We have in our garden a tree not mentioned here in which we have watched a dozen kinds of birds eating the fruit." It is hoped, too, that this information will then be passed on to the writer, so that his records of food plants for birds may be augmented and future articles will give a still wider choice of plant varieties that may be used to attract birds and at the same time beautify the home grounds.

C. Russell Mason
Secretary-Treasurer
Massachusetts Audubon Society

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 April 20, 1945 NUMBER 4

SPRING RUSHES ON

THE LILACS in the Arnold Arboretum will be in full bloom on April 24, nearly a full month earlier than normal. Unprecedented and continued warm weather, in which several weather records have been broken, has advanced spring this year to a point where it is so early that many of the "oldest residents" have difficulty in remembering a similarly advanced period. Our records of actual blooming dates during the last fourteen years, are represented in a table in this issue of Arnoldia: this shows far better than many words of explanation just what has happened over a period of fourteen years.

The early lilacs bloomed well. *Syringa oblata* and its derivatives have been in flower for a week, and with unusually warm weather many of the *S. vulgaris* varieties are in bloom today with the best of the flowering display to appear by the middle of the week of April 22, unless very cold weather intervenes to retard them. Crab apples are now in full bloom.

There has been very little winter injury in the Arboretum apparent up to now. Some damage by rabbits and mice has been done to plants in the nursery, as is usually the case when the snow cover persists for an appreciable length of time. Those who are interested in the redwoods will be sorry to learn that the last of our *Sequoiadendron giganteum* (*Sequoia gigantea*) died this winter. These were what remained of an original shipment of six plants, collected especially for the Arboretum at the upper limits of this species in the Sequoia National Park. They were selected from sites on Mount Whitney because of their apparent resistance to cold. All six were carefully planted in a nursery adjacent to the greenhouse that is protected on all four sides with a seven foot board fence. They were given every attention at planting time and really pampered during the hot summer months. Three of the plants died in the second and one in the third winter, leaving two plants which thrived without much noticeable injury until the spring of 1944. One of these was planted in a protected place in the Arboretum in 1944, and the other was left in the nursery. Both plants died in the past winter for no apparent reason, since the temperatures were not unusually low, and the snow

Blooming Dates of Plants Growing in the Arnold Arboretum

	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
Abeliophyllum distichum	—	—	—	21	17	1	—	1	24	m 1	17	—	—	24	M 29
Acer rubrum	10	—	1	9	18	M 30	14	M 23	20	m 1	6	—	18	12	M 28
Acer saccharinum	M 1	J 15	J 24	M 17	M 11	M 17	J 14	M 23	M 5	—	M 28	M 9	M 18	M 14	M 10
Cercidiphyllum japonicum	12	20	21	18	20	12	17	14	28	m 1	15	—	27	30	M 29
Cercis canadensis	30	m 1	28	—	m 1	m 7	—	m 5	m 20	—	30	—	—	—	15
Cornus florida	m 3	m 10	m 4	—	m 9	m 8	m 14	m 13	m 22	m 17	m 19	j 5	—	—	22
Cornus mas	7	3	1	13	17	16	10	1	20	m 1	15	3	—	22	M 31
Corylopsis pauciflora	25	23	29	22	19	3	—	15	25	m 1	17	—	—	29	6
Daphne Mezereum	5	—	9	1	M 25	—	8	M 25	20	28	15	5	—	20	M 28
Dirca palustris	3	10	9	7	21	M 30	14	14	20	m 1	19	20	—	23	M 28
Forsythia ovata	10	17	—	18	19	1	4	1	20	m 1	—	—	—	22	M 28
Hamamelis mollis	F 25	J 15	J 25	—	M 7	M 20	J 11	—	—	—	—	M 5	—	M 11	M 3
Hamamelis vernalis	N 29	D 3	N 28	N 21	D 12	D 13	D 19	N 21	—	—	M 27	D 31	D 20	—	M 3
Lindera Benzoin	—	21	29	19	—	19	19	15	28	m 3	18	—	—	m 2	1
Lonicera praeflorens	2	2	M 30	7	10	M 27	9	1	13	22	14	3	—	22	M 29
Lonicera Standishii	12	J 21	19	18	18	—	—	1	22	m 2	18	5	—	22	1
Magnolia denudata	17	21	—	19	20	22	25	15	29	m 4	20	24	28	m 1	2
Magnolia Kobus borealis	17	20	29	19	—	19	19	15	m 1	m 4	—	—	—	—	2
Magnolia Soulangeana speciosa	18	24	—	21	25	23	23	m 1	m 10	m 12	m 1	24	28	m 3	10
Magnolia stellata	10	17	19	15	19	M 31	12	14	29	m 1	14	21	26	29	M 28
Malus baccata mandshurica	27	m 3	26	—	m 2	30	m 6	m 25	m 18	m 11	30	m 30	—	m 9	8
Prunus Armeniaca	20	21	—	—	—	22	25	16	m 10	m 6	19	23	—	m 2	5
Prunus concinna	22	29	29	—	—	23	m 1	19	m 13	m 9	20	22	—	m 3	5
Prunus Davidiana	10	6	9	—	—	M 30	9	1	22	26	—	—	—	—	M 28
Prunus incisa	22	28	m 1	26	27	24	m 1	20	m 13	3	—	24	—	m 4	11

	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
Prunus mandshurica	17	20	—	20	—	14	17	13	m 6	—	18	—	—	m 29	5
Prunus nigra	30	m 1	—	m 1	m 1	—	m 7	20	m 13	—	—	m 1	—	m 5	16
Prunus Sargentii	20	29	m 1	22	26	22	m 1	20	m 13	m 5	20	24	—	m 2	5
Prunus subhirtella	22	29	21	—	27	25	m 1	20	m 13	m 6	—	24	—	m 4	8
Prunus subhirtella pendula	22	29	29	—	27	—	m 1	20	m 13	m 7	20	24	—	m 3	8
Prunus tomentosa	20	21	—	25	27	23	25	16	m 9	m 8	19	20	—	m 5	6
Prunus triloba multiplex	22	m 1	—	—	28	m 1	m 1	20	m 13	m 10	—	27	—	m 6	8
Rhododendron carolinianum	m 6	m 10	m 5	m 8	m 10	m 12	m 10	m 8	j 2	m 18	m 19	m 12	—	m 18	—
Rhododendron dauricum	—	J 13	—	—	—	—	10	M 27	20	26	15	5	—	29	M 28
Rhododendron obtusum Kaempferi	m 6	m 12	m 7	m 6	m 10	m 12	m 10	m 8	m 27	m 16	m 19	m 2	—	m 17	23
Rhododendron Schlippenbachii	—	—	—	—	m 1	—	m 5	28	—	m 12	—	—	—	—	16
Rhododendron Vaseyi	m 9	—	—	m 6	—	m 8	m 13	m 1	—	m 18	—	—	m 20	—	18
Rosa Hugonis	m 15	m 22	m 26	m 15	m 20	m 22	m 19	m 18	j 2	m 25	m 19	m 15	—	m 20	—
Syringa vulgaris	m 15	m 24	m 26	m 16	m 21	m 22	m 21	m 17	j 2	m 25	m 14	m 21	—	m 23	24
Ulmus americana	3	3	—	3	1	M 29	M 13	M 23	M 20	—	13	6	7	11	M 20
Viburnum Carlesii	27	30	25	—	28	m 3	m 3	m 3	m 18	m 7	30	m 2	—	m 11	14
Viburnum fragrans	5	J 14	8	15	19	M 30	J 15	10	20	m 1	14	5	—	20	M 28

Note: All dates given are for **April** unless otherwise noted. Many of these figures have been supplied by Mr. W. H. Judd, Propagator of the Arnold Arboretum. The dates represent the first day each species could be considered to be in full bloom. A study of them shows that the spring of 1945 is unusually early.

N = November
D = December
J = January
F = February
M = March
m = May
j = June

cover was unusually deep, the latter being a favorable condition for this species. This is not the first time redwoods have been planted in the Arboretum, several attempts having been made before, but eventually all the plants have succumbed. It was hoped that this last trial would result in success since the plants had been carefully selected for this purpose.

The shrub collection is worthy of special inspection this spring. For many years the thousand different shrubs growing here have been allowed to encroach on the walks and it has been increasingly difficult to maintain grass walks between every line of shrubs. During the past year every other walk was removed and this ground will be kept continually cultivated, thus giving the plants a better soil in which to grow. Last fall all the plants were heavily pruned in order to induce them to grow into convenient size at a reasonable distance from the walk. This heavy pruning, in some cases, resulted in removing the greater part of certain plants, but such an operation often becomes necessary even in the home garden. Much can be learned by the careful observer now, just from an inspection of these rows of shrubs, for, in cases where it is obvious that the plant was heavily pruned, its response to such pruning is most interesting. As an example, on one or two of the overgrown honeysuckles and pearl bushes, only a few very large branches were left on the plants. These now have many small shoots coming directly from the few remaining large woody stems. Other shrubs, pruned similarly, are not responding in that fashion, showing clearly that they should be pruned in a different manner. A close scrutiny of these shrubs will disclose many interesting facts about pruning.

After the pruning, the soil was limed and thirty cords of cow manure were spread around the plants. This should result in excellent growth during the present season. All the labels have been set back closely against the plants to enable us to cultivate the soil between plants and walks with a rototiller. With a minimum amount of hand hoeing around the plants and most of the work to be done by machine, the maintenance of the shrub collection should now be on a much more economical basis.

One other change should be noted in the Arboretum this spring and that is the radical reduction of the large nursery at the rear of the greenhouse. Two thousand plants had to be moved on very short notice this spring because the University is to construct a new wing to the State Antitoxin Laboratory, for use in certain recently developed phases of blood investigations. This projected construction has a high priority and the building will probably be erected immediately. However, the plants had to be moved at this time, because of the unusually advanced season, in order to save them. Some have been planted in a new nursery within our grounds between South Street and the New York, New Haven and Hartford Railroad tracks, and the remainder have been planted on the recently acquired Case Estate at Weston.

It should be emphasized once more that the peak of the blooming season for azaleas, lilacs, crab apples and many other plants will be the week of April 22 this year, and not the latter part of May as is normally the case.

DONALD WYMAN

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 | May 18, 1945 | NUMBERS 5–7

THE PARK ARBORETUM—HOW TO ESTABLISH ONE AS A LIVING WAR MEMORIAL

DURING the first week of 1945 six requests came to the Arnold Arboretum for complete information as to how to start an arboretum. Since that time, we have received many more similar requests, clearly indicating that the arboretum idea is definitely being considered in widely separated parts of the country.

The arboretum idea, initiated by the establishment of the Arnold Arboretum in 1872, has within the present century been widely extended, there now being approximately fifty arboretums in the United States alone, some large and well endowed, some small and more or less in their infancy.

Professor Charles Sprague Sargent, first director of the Arnold Arboretum, long ago realized the need of arboretums strategically located in the various climatic zones of North America. Many new arboretums were established during his time. Such institutions are not competitive but co-operative, and today there is a great need for more of them.

After this war there will be the desire on the part of every community for a war memorial. A "living" war memorial, which will bring beauty, pleasure, recreation, and a certain amount of education to the people of a community over a long period of years, will undoubtedly be a first consideration in many places. This may eventually be expressed as a park, a street or highway planting, or a cemetery development, but in many communities, be they large or small, the "Park Arboretum" as a war memorial should have careful consideration.

In order to be a fitting memorial, the Park Arboretum should be carefully planned, well financed, and competently administered. This issue of Arnoldia is

Note: *Chronica Botanica* will contain a paper early next year on the development of arboretums in this country. It was written by Gordon Cooper, Landscape Architect, of Cleveland, Ohio, who has spent a great deal of time on the development of certain arboretums, and on an analysis of a mass of data on the subject.

devoted to ways and means of establishing and maintaining a satisfactory Park Arboretum, many of the suggestions here offered resulting from the successful development of various arboretums in widely separated parts of the country.

Definition

A Park Arboretum, as considered in the following discussion, is an ample area set aside for the growing and effective display of all the different kinds of worthy ornamental trees, shrubs and vines which can be grown out of doors in a given area, their maintenance and proper labeling. It does not necessarily have to include *all* the woody plants that can be grown out of doors in a region, nor does it necessarily have to include expensive beds of annuals and perennials, nor large display greenhouses filled with exotic plants which will not live out of doors in winter.

An arboretum differs from a park in that in the former a serious effort has been made to plant an extensive collection of many kinds of **labeled** woody plants for display purposes. Many parks are planted without the labeling of any plants and with the use of only a small number of locally available plant species. Some parks, it is true, contain a certain number of labeled plants, as for example the Boston Public Garden; Roger Williams Park in Providence, Rhode Island; Fairmount Park in Philadelphia; and others throughout the country, but no consistent effort is made in most of them to label and keep labeled **all** the different kinds of plants grown. Both a park and an arboretum can be used for recreational purposes; but the arboretum goes beyond the park in that it becomes highly educational to many of its visitors, demonstrating by means of labeled specimens what good species are available for planting in a given area.

An arboretum differs from a botanical garden in that the emphasis is placed on the growing of **woody** plants in the arboretum, whereas in the botanical garden emphasis is also placed on the growing of other kinds of plants as well, sometimes even to the exclusion of woody plants. Large rock gardens and expensively operated rose gardens are frequently found in arboretums, but these are not essential when funds are limited.

The purpose of any arboretum, be it large or small, is primarily to grow **(and to keep labeled)** the best of the ornamental woody plants which will thrive in a given locality. Many other objectives may be considered, such as the actual introduction of new plants into cultivation, actual exploration of remote regions, the growing of **all** types of woody plants hardy in the area, scientific investigations of various kinds including plant breeding and hybridization, the maintenance of a large herbarium and library, and laboratories of various types—these may be legitimate functions of an arboretum, depending on the funds available, and the qualifications of the members of its staff. However, small communities should not be deterred by these weighty and often expensive objectives for they may be omitted altogether where funds for the maintenance of such purposes are

unavailable. If the arboretum effectively demonstrates "the best" of the woody plants hardy in its area, this one purpose alone will make it a most valuable asset in the community it serves. It is this kind of an arboretum that will be considered here as the "Park Arboretum."

Charles Sprague Sargent, first director of the Arnold Arboretum, used to say that in order to start an arboretum it was necessary to have a thousand acres of land with at least a million dollars endowment; yet he started an arboretum with only 125 acres of land and one hundred thousand dollars endowment, and in the early years of the Arnold Arboretum he had only one third of the income of that modest endowment for annual expenditure. There is still the need for large arboretums placed in different regions representing different climatic conditions where all the woody plants hardy in an area may be grown and which are well endowed for scientific investigations. This is undoubtedly what Professor Sargent had in mind, for the Arnold Arboretum was, and is, that kind of an institution. But times are changing. With the extensive garden club movement and increased tendency away from urban dwelling, more and more people are becoming interested in growing plants. The Victory Garden movement has undoubtedly aided this development.

A new conception of an arboretum is coming into being. It is very well expressed in the plantings of the Arthur Hoyt Scott Horticultural Foundation at Swarthmore College, Swarthmore, Pennsylvania. The Park Arboretum is adaptable to communities smaller than Boston, Philadelphia, Chicago, New York, St. Louis or Seattle. It is feasible where there is no particular desire to finance expensive scientific investigations, but where there is a great need to grow and demonstrate to the public "the best"* woody plants hardy in a particular area. It is readily seen that this idea is a flexible one for the actual size of the arboretum may vary considerably. The Park Arboretum idea is based on the theory that the same old varieties of plants may be superseded by new and better varieties. There are new varieties of cars, of refrigerating devices, of clothes and women's hats, and there are new varieties of plants as well. In the arboretum the "old" varieties are grown side by side with the "new," both often being available to the plant-buying public. But with the best varieties only being displayed in the Park Arboretum, interest and variety in private planting, and municipal planting, will be greatly augmented. With this conception in mind, the committee responsible for planning the Park Arboretum should be so constituted as to give the best advice possible for its usefulness and adaptation to the community.

Functions of a Park Arboretum

The purposes for establishing an arboretum should be carefully considered before the plan is publicly broached. Some of the more important functions of a Park Arboretum are: —

*Best used here in the sense of the best ornamental.

1. To grow "the best" woody plants hardy in the area in order that home owners may become acquainted with their names, their ornamental characteristics and the proper methods of culture.
2. To show a **complete selection** of all that is considered the best from an ornamental standpoint among the woody plants that it is possible to be grown in the area.
3. To serve as a means of **introducing** new woody plants into the area, regardless of the source from which they may come.
4. To disseminate a knowledge of woody plants to the public. This would include information on culture, pruning, fertilizing and possibly a continual study under local conditions of just what varieties are "the best," including even cooperation with schools, garden clubs and other organizations.
5. To test the hardiness of untried varieties.
6. To provide an out of doors laboratory for students of botany, horticulture and nature study.
7. To increase the productivity, economic importance and beauty of an area, by intelligent and interesting planting, and by introducing plants not grown there before.
8. To provide recreational stimulus to the public by means of walks, drives and beautiful displays, and to stimulate the pleasure of learning to know new plants which might be adapted to planting on private property.
9. To serve as a "Permanent Living War Memorial," beneficial to the people living in the area and attractive to visitors from outside the area.

Each one of these functions should be studied individually with view to the best interests of the community. One of the first decisions to be made is whether the park system present satisfies the desire of the people for formal rose gardens or beds of annuals and perennials. Would the people be interested in only a garden of woody plants? Are the lives and habits of the people so ordered that there would be little interest in an expensive display greenhouse for showing material in the winter? Fortunate is the community which can sell the idea of a Park Arboretum to its public without some of these things, for such an arboretum will be less expensive to operate and will actually include a greater variety of woody plants in the end.

If the community is small, the effective functions of the arboretum will be largely display. If the community is large and funds are available, the functions may also include scientific investigations, especially if there is an institution of higher learning with which the arboretum may be connected. How far this may go will depend on the community, its nearness to other large arboretums, the availability of funds, and on leaders in the municipality.

Method of Establishing an Arboretum

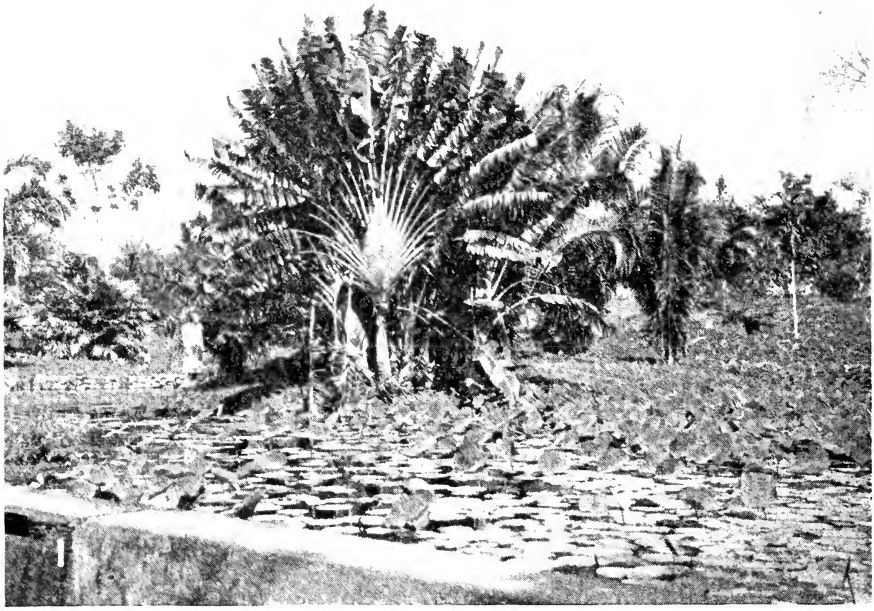
The first arboretums started as **private gardens** where individuals became in-

terested in assembling a collection of trees and shrubs. John Bartram has the credit of establishing the first large collection of trees and shrubs in this country when he established his garden in 1728 at Kingsessing on the banks of the Schuylkill River near Philadelphia. Since that time, many private collections have been established at one time or another but frequently many of them pass out of existence after the death of the original owner. Today there are a few private arboretums worthy of the name. Among them would be the one started by Mr. H. H. Hunnewell in Wellesley, Massachusetts, in 1852, and devoted mainly to conifers; and that of Mr. Stanley Rowe of Cincinnati, Ohio, which now contains 1500 different kinds of woody plants.

The **government operated arboretum** is exemplified by the Dominion Arboretum adjacent to the Experimental Farm in Ottawa, Canada. This is 56 years old and contains about 2500 species and varieties of woody plants. It is owned and operated by the Canadian government. Our own National Arboretum at Washington, D.C., has been started, but little planting has been done due to lack of available funds. Even national government budgets are frequently the playthings of legislators, and the future of an arboretum under government jurisdiction, though safer than a private arboretum, may still suffer much from a fluctuating annual budget.

An arboretum is sometimes part of the **park department** of the city. Such is the case with Highland Park and Durand-Eastman Park in Rochester, New York. The 484 acres constituting Durand-Eastman Park was originally a gift to the city, made by Dr. Henry S. Durand and George Eastman, but maintenance operations are carried out exclusively by the city Park Department, support being from city taxes. The advantages are obvious, for the park personnel is usually well equipped to maintain a collection of trees and shrubs. However, disadvantages are often evident. In many a park department the annual budget is subject to devious manipulations by politicians who may have no interest in park plantings, and in all too many cities in this country the park department budget is the first to suffer reductions when city expenditures are cut.

The best method of establishing an arboretum is to provide a properly safeguarded **restricted endowment**, the income from which may be used only for specified purposes. The endowment should be sufficiently large to provide a reasonably ample annual income, for in this way permanence is assured. It will be necessary for the Planning Committee to estimate the annual expenses in advance. Many arboretums today are being operated wholly or in part by income from endowments. The endowment is not sufficient in some instances to cover all expenses and additional funds are necessary from the tax budget or from private sources in order to make it possible to attain the ends desired. When the income from an endowment must be augmented by annual popular subscriptions or by annual grants from the city park department, many difficulties arise. This is, in general, a most unsatisfactory way of operating an arboretum, for projects started



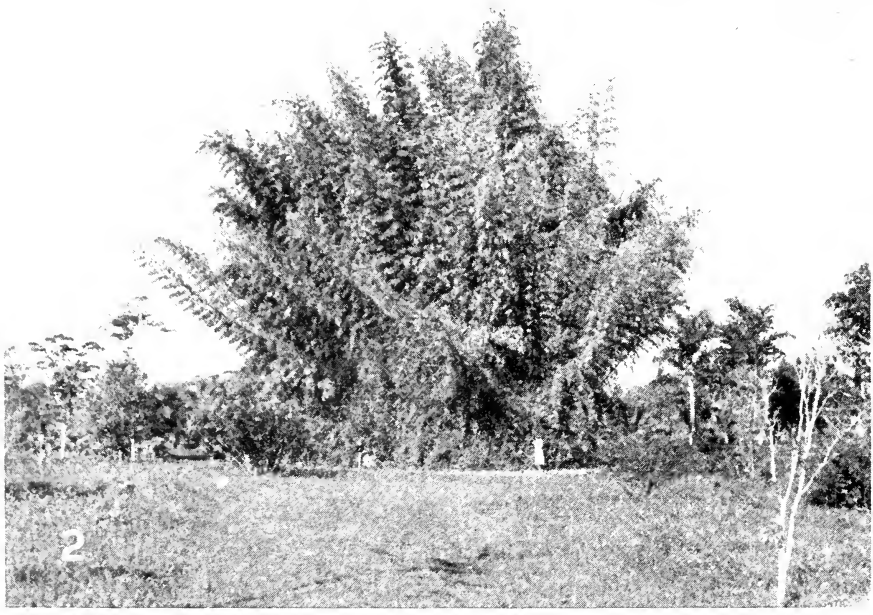


PLATE V

Plants in the tropical arboretum of the Atkins Institution of the Arnold Arboretum, Soledad, Cienfuegos, Cuba, one of the few arboretums in Tropical America.

1. The Traveller's Tree. 2. Bamboo at its best.

one year when funds may be ample may have to be curtailed or even discontinued in another year. Assured success is best insured when endowment is possible.

Usually there is a board of directors formed to oversee the administration of funds in privately endowed institutions. Such is the case with the Morton Arboretum at Lisle, near Chicago. Frequently it has been found advisable to associate the arboretum (with its endowment) with an institution of higher learning. Such is the case with the Arnold Arboretum (Harvard University), Arthur Hoyt Scott Foundation (Swarthmore College), Morris Arboretum (University of Pennsylvania), each one of which has its own endowment. The Arboretum of the University of Washington (Seattle) is connected with the University with most of its maintenance funds coming from state appropriations. This source is supplemented by membership fees, and an attempt is now being made to secure a restricted endowment.

The association with a university is ideal for it tends to add permanence to the arboretum; sound and intelligent advice on arboretum problems are always available from university staff members, and the arboretum can serve as an ideal out of doors laboratory to augment classroom instruction. It is also true that the facilities offered by an arboretum would be used more as a result of this association than might otherwise be the case.

When budgetary items are reasonably fixed from year to year, the work of an arboretum can proceed unhindered by extraneous circumstances. The main object in establishing an arboretum is to make it permanent, to provide for a permanently dependable source of income, and thus insure its usefulness to be continuously available to the greatest number of people. There is no better way to insure this than to provide an ample endowment at the beginning.

Selection of the Site

Before the plan can be made, a site must be decided upon, and the size of the area to be developed should be determined in connection with the sources and amount of available funds. The site could well be a local spot of beauty, of historical significance, or existing part of the Park Department if suitable. It will take intelligent discussion and sound advice to decide on the site, for the general plan and the functions of the arboretum also must be considered simultaneously. Arrangements should be made for alternatives in case the amount of money originally hoped for is not eventually forthcoming. A very important factor is accessibility.

Who is to plan

Almost any enthusiastic temporary group may be responsible for initiating public interest in the Park Arboretum, but a planning committee responsible for preparing definite plans associated with a campaign for raising funds should be carefully selected. The planning committee could well include an experienced landscape architect; a representative from the park department who would know

about future park plans; a banker; a person well versed in the values of real estate; prominent nurserymen; and representatives from prominent civic organizations who would represent the desire of the people to have an arboretum and the will to work for one. A representative from an active arboretum, similar in size to the one contemplated might well be called in for consultation. Large committees move more slowly than small ones, but somehow all interests should either be represented or heard prior to the time the actual site is decided upon and the plan is completed.

Ways of initiating interest and action

It is a simple matter to propose the idea of an arboretum in any community lacking one. Except in strictly urban areas, most home owners are interested in planting their properties so as to make them beautiful and enjoyable for as much of the year as possible. In strictly urban areas the people always desire to get into the open for rest and relaxation. Consequently, people in general are receptive to the idea and do not begin to "hedge" until the time comes for asking for increased taxes or donations for endowment or for annual support.

Many community organizations are well equipped to assist in a campaign for an arboretum. The garden club movement is fortunately firmly imbedded in almost every community. Nature clubs, bird clubs, forestry associations, conservationist groups and other organizations by their very nature should be interested in the idea and their members afford an excellent basis for enthusiastic support. Schools, parent-teachers organizations, Rotary and Kiwanis Clubs, women's organizations, church groups, town park departments, all should be thoroughly canvassed and their support enlisted.

Horticultural experts could give illustrated lectures to show the kinds of plants which might be grown. Local landscape architects could have a field day in discussing possibilities. Staff members from existing arboretums could come and show what has been done in other committees, and discuss frankly the possibilities of a local arboretum. Costs could be discussed by committees representing various organizations. When opinion becomes fairly crystallized, some group could offer a sum to be used for the preparation of a definite plan. This was done in Seattle with excellent results. It was felt by those in charge that a topographic map of the Seattle Arboretum site was necessary, showing the two-foot contour lines. Such a map was prepared by the State W. E. R. A. at a cost of $5465.00. Then the Garden Club of Seattle raised $3000.00 and under its auspices a plan was drawn by a prominent firm of landscape architects. By the time the plan drawing stage is reached, public opinion should be fairly well crystallized in the form of a planning committee or "Arboretum Committee" which would have the authority to work with the individuals drawing the plan.

It is always advisable to have a well conceived plan on paper, regardless of what the local situation may be. The man or men eventually to be in charge of

an arboretum do not just begin to plant trees and shrubs, Roads must be constructed, paths provided for pedestrians, a certain amount of grading done, certain plants placed in situations where they will grow best, a propagating unit intelligently placed, water pipes laid where they will do the most good, drainage provided for in certain instances—in short, a thousand and one things should be thought of before the actual planting is started. In some instances the soil of the arboretum site may be very poor, and arrangements must be made to grow cover crops on it for several years (this was done on the site of the National Arboretum in Washington), thus preparing the soil over a period of time before any trees or shrubs are planted. Water, in the form of a running brook or a pond, can be used to excellent advantage if properly planned for, whereas without planning such a feature might easily become a liability. Trained horticulturists experienced in arboretum objectives and various professional landscape architects are familiar with these phases of the project. Thus if carefully considered plans are prepared in advance, much money can be saved, and many disappointments avoided by doing the right thing at the right time in the right manner.

How to Plant

The actual placing of the different groups of trees and shrubs should be done according to a carefully conceived plan in which the **individual needs of the plants are considered as well as the best interests of the public.**

Some of the arboretums have been laid out so that the plantings follow a definite botanical sequence of families and genera. This is not necessary or essential in the Park Arboretum. It is advisable to keep all the plants in a certain genus together if possible, and to so place the important genera that they are easily seen from roads and paths. All projected plantings should be critically considered from the standpoint of landscape design.

Azaleas and rhododendrons, if used, should be given a situation with acid soil where they have some protection from winter winds. Lilacs should be so placed that people can easily walk among them and observe them closely as well as from a distance. A collection of hickory or walnut trees, for instance, might be placed in an out-of-the-way spot, where they can be seen from a distance. Colorful displays that have particular seasonal interest should be easily accessible and where they can be seen from many vantage points. Some plants like wet soils, some do better in dry soils. Each group should be placed where it will grow best.

Special attention should be given to displays of seasonal interest. Lilacs, for instance, are of interest only in the spring and might well be grown near the viburnum collection, which is of interest chiefly in the fall. The oriental crab apples, on the other hand, have seasonal interest both spring and fall and hence might be in a spot by themselves. Certain azaleas and the flowering dogwood bloom at the same time and might be planted adjacent to one another. A bank of red roses that will bloom in late June might be planted near the collection of

mock oranges to give it additional color interest when its white flowers appear. Evergreen trees are frequently kept by themselves, but intelligent planting would call for the placing of a few deciduous trees in such a collection, especially those which color vividly in the fall, to lend color and variety. And in or near plantings of deciduous trees it is usually desirable to place a certain number of selected evergreens.

It may be advisable from a maintenance standpoint to grow many shrub groups together in long beds with grass walks between them. Planted in this manner the shrubs are easily observed closely, and a large number can be studied with comparatively little effort, and direct comparisons made. Roses, and representatives of such genera as *Weigela*, *Spiraea*, *Deutzia*, *Philadelphus*, *Chaenomeles*, and several other genera come in this group that can be so treated. Such a collection, though of little *landscape* interest, has a great deal of interest to the public at all times of year. The "shrub collection" at the Arnold Arboretum contains a thousand different kinds of shrubs in parallel beds. It might well be one of the features in any arboretum, placed easily accessible to the main entrance, where people with little time can spend it to best advantage.

What to plant

What constitutes "the best" and who is competent to judge which are "the best" is always a debatable question. There are in existence several large collections of woody plants in this country and attempts are continually being made to make reliable lists of "the best" ornamentals in each group (family or genus). Such available lists could be utilized at the start. Let me explain more fully how this might be done, using the collections at the Arnold Arboretum as an example.

At the present time there are approximately 6500 different species and horticultural varieties of woody plants being grown in the Arnold Arboretum. Certain groups are larger than others. Thus in these collections there are 72 viburnums, 98 mock oranges, 132 maples, 180 crab apples, 423 lilacs, and 550 hawthorns. Taking the lilacs for closer scrutiny, there are approximately 330 varieties of *Syringa vulgaris* alone, of which 32 have white flowers! Certainly all do not have outstanding ornamental value. In fact, it is extremely difficult to tell some of the varieties from others. It would be difficult to locate nursery sources for all, and certainly many have been discarded by commercial growers as being unsatisfactory. This large collection of lilacs has its place as a laboratory for scientific study (Mrs. Susan D. McKelvey did much of the work for her monograph on lilacs in this collection) but many of the varieties could be eliminated if scientific study were not one of the functions of this arboretum. The collections would be much more ornamental if the number of varieties were reduced, for then massed plantings of a single lilac variety could be made in space now occupied by twenty different varieties, for the ornamental effect of a massed planting is always more effective, especially for the casual observer.

PLATE VI

The famous "Lilac Path" at the Arnold Arboretum. This collection contains over 400 different varieties of lilacs. A collection of these plants, easily accessible to the public, provides a feature in any arboretum where they can be grown.

In a small arboretum, a collection of 50 or even 25 varieties of lilacs might be satisfactory—only those being selected for planting which are considered to be the most ornamental and representative of the entire group. Just as many *plants* could be used as in our large collection if space were available, but far fewer *varieties*. The same principle could be used in selecting "the best" in the other groups of plants. The advice of local plantsmen will prove invaluable at the start when considering such points.

The number of plants

The number of plants selected at the beginning will vary with the part of the country in which the arboretum is located, with its size, financial resources, and its propagating facilities. A few examples will illustrate this point. In making a preliminary report of proposed plantings for the Cornell University Arboretum, now called "Cornell Plantations," there were approximately 2,000 species and varieties of woody plants listed as worthy of trial at the beginning. The Arthur Hoyt Scott Foundation of Swarthmore College listed approximately 2,800 species and varieties of woody plants that were being grown there in 1942. The 6,500 species and varieties now growing in the Arnold Arboretum might be reduced as much as one half or even more if only the most ornamental were to be selected. These figures are, of course, very general but they give some idea of the number of plants worthy for first consideration. The smaller the arboretum, the fewer the number of specimens of any one variety which should be grown.

The first places to investigate as a possible source for plant materials would be the local nurseries. Nurseries at a distance may be able to supply many varieties unavailable locally. It will, of course, be found that some species are unobtainable from commercial sources. Then it is necessary to provide for a propagating unit and grow wanted varieties from seed, cuttings or by grafting, where the propagating material is supplied by other arboretums, private individuals, or in some instances where seed is collected in native habitats primarily for this purpose. The smaller the plants when purchased, the lower the initial expenditure. The larger the plants at the start, the more quickly an initial display can be made for the public to enjoy. The factors here involved are obviously important ones and should be carefully weighed by the local planning committee.

The amount of space required

This, too, varies with the arboretum, its size, funds available for maintenance, and its functions in the community. Should much space be given over to massed plantings of single varieties? Massed plantings of azaleas, lilacs and crab apples are most ornamental and can be extremely effective, whereas massed plantings of maple trees, for instance, take up much more space and have little ornamental effect. The enforcing of a rigid rule that no more than two or three plants of any one variety can be planted might be enough to defeat the purposes of an arbore-

tum in the eyes of the public. The Arnold Arboretum covers an area of 265 acres, yet there is little room for additional planting, even though nearly half the present area is woodland. This wooded area is considered absolutely essential in setting off the man-made plantings to good advantage, and to serve as an added source of beauty and interest to visitors. Viburnums alone take 30,000 square feet (190 plants), while mock oranges take approximately 34,200 square feet (184 plants). Three and a half acres constitute what is known as the shrub collection —long beds of miscellaneous shrubs with grass walks between, in which about 1,000 different species and varieties are grown. Almost a third of this is taken by the grass walks. Such a shrub collection affords an excellent means of teaching the public a great deal in a small area, but affords no opportunity for gorgeous displays of massed plant materials.

Another way of approaching a decision on the amount of space necessary would be to take the figure of 2,000 species and varieties as a starting point (the number suggested as the starting point for consideration by Cornell Plantations). If two plants each of these were planted in long nursery rows, the distance between plants averaging 20 feet, they would take about 37 acres. Would such a planting in nursery rows have aesthetic value and be of interest to the public? Of course not! On the other hand, the proverbial "thousand acres" might prove too much for practical purposes. Here is another opportunity for intelligent planning by the Arboretum Committee, and an opportunity where practical plantsmen and landscape architects can lend invaluable assistance.

Costs

The maintenance of plants in an arboretum need not be expensive. Spraying, pruning, planting, should not be curtailed in any one year. If spraying and pruning be omitted two or more successive years because of lack of funds, the plantings quickly show neglect and it may take several years to bring some of the plants back into vigorous growth. A fluctuating budget does not allow for intelligent annual operation, one of the best arguments against trying to operate too extensively on the basis of funds solicited annually.

The actual amount of money necessary to operate a Park Arboretum varies with the size of the arboretum, the labor situation, equipment, the objectives and the extent of its formal plantings. A good park administrator who knows park maintenance costs in the locality where an arboretum is to be established can give excellent advice regarding such costs. However, certain things are known. Lilacs, crab apples, quinces, and many other groups are very susceptible to infestations of scale and should be treated annually with a dormant spray to control this pest. They need a certain amount of renewal pruning every few years, without which periodic care they will very quickly turn into unattractive specimens which have little ornamental value. No collections of these particular kinds of plants should be contemplated unless they can be cared for properly each year.

As an example of the cost for maintaining one group of plants, there are approximately 600 lilac plants in the collection at the Arnold Arboretum. Spraying these with a dormant oil spray takes four men about a half day, and about 600 gallons of spray mixture. Annual pruning is currently not carried out as well as it might be because of the present labor situation, but if three good pruners could spend an average of two weeks in this collection each year, it could be kept in excellent condition. The cutting off of flower clusters is a time-consuming operation but should be done for the benefit of the next season's display. Although we cannot do this completely every year, if done properly (as it should be) it would take four men at least two weeks. This will give some idea of how to approach the problem of prospective costs in each of the large collections contemplated.

Viburnums need practically no spraying and very little annual pruning. Elms must be sprayed in this area for elm leaf beetle. The larch case bearer is a difficult pest to control and larch trees must be sprayed with lead arsenate as soon as small worms appear. Canker worm, gypsy moth, willow leaf beetle, Japanese beetle—all attack many kinds of plants and must be controlled in various parts of the country. Our total time spent in spraying in the Arnold Arboretum amounted last year to about thirty man days, with approximately $250.00 expended for the purchase of spray materials. Of course, the necessary spray equipment must be available, and its initial cost must be considered.

Pruning, also, cannot be definitely estimated. Young plants, pruned properly at transplanting time may require no pruning for several years. On the other hand, in an established arboretum with many kinds of mature trees, a wind, snow or ice storm may cause immense damage. The hurricane of 1938 cost the Arnold Arboretum in pruning and the removal of fallen or badly damaged trees and shrubs about $6,500 above the budget provided. This did not include the irreparable loss of old established specimens. This past winter, one fourteen-inch snow storm with very heavy snow broke so many branches that it will take approximately seventy-five man days to repair this damage alone. There have been winters, on the other hand, when little damage was done, and pruning in the entire arboretum did not take more than a hundred man days.

Planting

Much time will be needed at the start of any arboretum for this operation. The size of the arboretum governs the annual planting, of course. During the past few years in the Arnold Arboretum, we have not spent more than fifty to seventy man days in planting new specimens in the collections in any one year.

Labor

This item is the most expensive in any park or arboretum. It can be controlled somewhat by the amount of grass cutting and leaf raking which is done. In some parks all grass areas are carefully cut with a lawn mower once a week. This is a very expensive operation. In the Park Arboretum certain areas given over to the

growth of deciduous trees and conifers the grass need only be cut but once a season, providing a few walks are open through these collections. In the shrub collection, which many people visit at all seasons of the year, the walks should be closely cut, as well as certain small areas along the main walks and near main entrance gates. But in many areas in the arboretum the grass need be cut only once a year and still the public will have ample space for circulation. Grass cutting is an essential annual operation to reduce the fire menace and must be provided for.

Hoeing by hand takes considerable time. The cost of this operation can be reduced by the use of mechanical equipment in the larger beds, and may be reduced still further by the use of some of the new hormone weed killers now available. The Arnold Arboretum employs eight laborers with occasional additions during spring and summer, a superintendent for the maintenance of the growing collections, as well as a propagator with his assistant, and a man in charge of labeling and mapping. These are not maximum requirements, probably might be termed the minimum labor requirements for an arboretum the size and age of the Arnold Arboretum. The Arthur Hoyt Scott Foundation at Swarthmore with an area of about fifty acres employs seven men, a part time director, and a part time gardener. The Morton Arboretum with 800 acres employs approximately fifteen men for the maintenance of the grounds.

Equipment

The more standardized mechanical equipment that can be utilized to good advantage, the less will be the expenditures for labor. Minimum equipment for a 200–300 acre arboretum might be:

Tractor (with sickle bar, plow, harrow, etc.)
Sprayer with tank capacity of at least 300 gallons
At least one ton and a half truck
2 power lawn mowers
3 hand mowers
2 sickle bar machines
Rototiller or small motorized cultivator
Mecanical saw
The best available hand saws, pruners, pole saws, etc.
for the type of work contemplated

Propagation

Every Park Arboretum should have its own propagating unit. Since many of the plants grown will be rare, they will not be available from commercial sources as plants, hence the arboretum will have to propagate many species from seeds, cuttings or grafts. There are decided advantages in having a nursery well stocked with materials, for plants so grown are easier to dig and move. They should be correctly named for if they are allowed to grow to sufficient size in the nursery, they can be properly identified before being transplanted. Larger specimens can be handled this way than would be advisable with purchased specimens.

The actual size of the greenhouse will depend on the location of the arboretum, its size, and the amount of material to be propagated. At the beginning, a great deal of propagating will be needed to provide material for contemplated plantings. Many of the older arboretums are concerned merely with a few replacements and material which is new to the collections.

It is amazing what a large amount of material can be propagated and grown to planting size in a small, well organized space. The Arnold Arboretum has one propagating house $50' \times 18'$ (erected with the accompanying potting shed and heating unit at an approximate cost of $20,000 about twenty-two years ago) and this is ample for its needs. The Morris Arboretum in Philadelphia has twice as much, the Morton Arboretum nearly three times as much, and the younger University of Washington Arboretum four times as much space. The Arthur Hoyt Scott Foundation at Swarthmore has only one small house, as does the arboretum in Whitnall Park in Milwaukee.

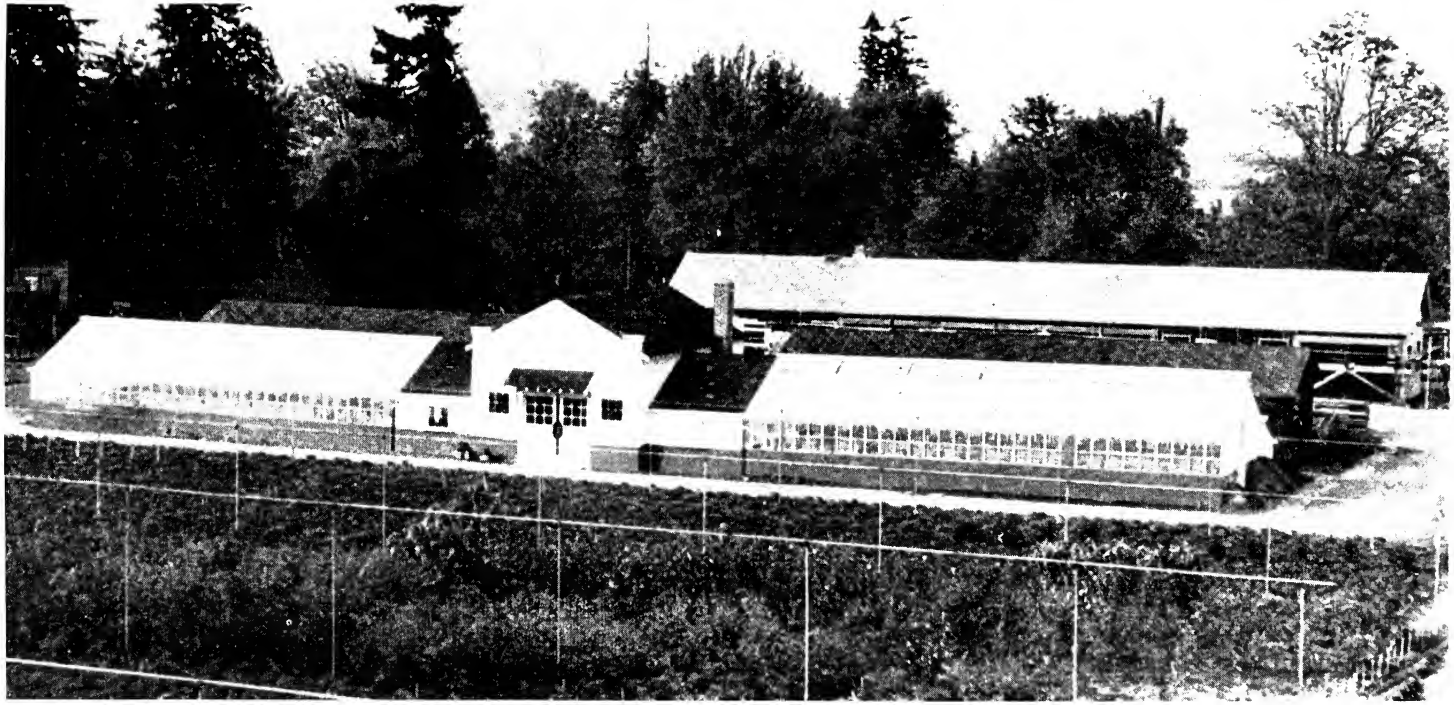
A pit house $50' \times 9'$ is essential in the north and lath shade houses are a requisite in the south. Frames are essential for wintering small plants and 1800 square feet of these might very well be contemplated. Nursery space varies with the size and age of the arboretum and the need for plant materials. The Arnold Arboretum has one-half to one acre of nursery space, varying from year to year; Morton Arboretum about three acres; and the University of Washington Arboretum has about seven acres under the Skinner irrigation system.

The services of an experienced propagator are essential. Sometimes he can work alone, sometimes he may need assistance, but in order to keep accurate records and to produce good plants, he should be thoroughly trained and experienced.

Labeling and Mapping

A most essential function of an arboretum is to keep the plants properly labeled. In order to maintain correct labeling it is essential that the plantings be accurately mapped. An active young man who is really interested in this work—and it takes a great deal of walking!—should be able to keep maps and labels up to date, providing he has some seasonal assistance. In the winter some of the labor force could paint and even print labels. In the summer, one or two high school boys might be hired to help with the mapping if this were necessary. Mapping with the alidade and tape is sufficiently accurate. We have found that maps approximately $2' \times 2\frac{1}{2}'$ on a scale of $1'' = 20'$ are practicable, but a few enlargements are necessary on a scale of $1'' = 10'$. It took nearly a year for two men properly to map the 265 acres in the Arnold Arboretum a few years ago, but once accomplished, the maps are easily kept up to date with a minimum expenditure of time.

If plants are not accurately and clearly labeled, the arboretum loses its educational function completely. Labels will disappear, often being appropriated by certain types of visitors, and others will become defaced. Thus a careful mapping



Courtesy of the Arboretum of the University of Washington.

PLATE VII

The well planned propagating unit of the Arboretum of the University of Washington, Seattle. Here the greenhouse, lath house at rear of greenhouse, storage sheds, and small nursery with overhead irrigation are ample for the propagating needs of a rapidly expanding arboretum.

of a collection makes relabeling of individual plants simple and accurate, for the critical and sometimes time-consuming matter of reidentification is not involved. One active and intelligent young man can keep a collection mapped and properly labeled, even in the larger arboretums, providing he has some seasonal help occasionally. A display label should be clearly visible on every plant except in instances where a large number of a single variety are used in mass planting. On the label, as a minimum, should appear the common name, the scientific name, and the geographic origin of the species.

In the Arnold Arboretum we have a small record label made of embossed zinc tape which is attached to every plant when it is planted in the collections. This remains on the plant indefinitely, and contains the accession number of the plant, its scientific name, the origin of the plant, and the date of its accession. These cost about ten cents per label for labor and materials. A larger wooden or metal display label is attached to each plant that is large enough to carry one. These cost about twelve cents per plant for labor and materials and will remain on the plant in good condition about five years. Certainly a plant worth placing in an arboretum is worth two labels at a cost of twenty-two cents! This mapping and labeling in a large arboretum may cost as much as $2500 per year, but it is worth it.

Educational costs

If the community is large enough, the director or superintendent of the Park Arboretum might be a man who could direct the work in the arboretum and at the same time give lectures to local groups concerning the plant materials in the arboretum and their proper use. He could write articles for local publication, conduct groups through the arboretum, and work with local groups for the general education of the public in better appreciation of the plants and their maintenance. The services of such a man are almost a "must" for the Park Arboretum, since a certain amount of educational publicity contributes materially toward a better utilization and appreciation of the arboretum by the residents of a community.

It would serve no purpose to give the actual operating expenses of any arboretum, since methods vary, functions of the arboretum vary, and wages vary. Each expense item should be understood before studying actual maintenance costs. The figures and facts given, however, should serve to help with the general plans of any Arboretum Committee. They should be interpreted by men familiar with maintenance work who at the same time are familiar with the proposed functions of the arboretum under consideration.

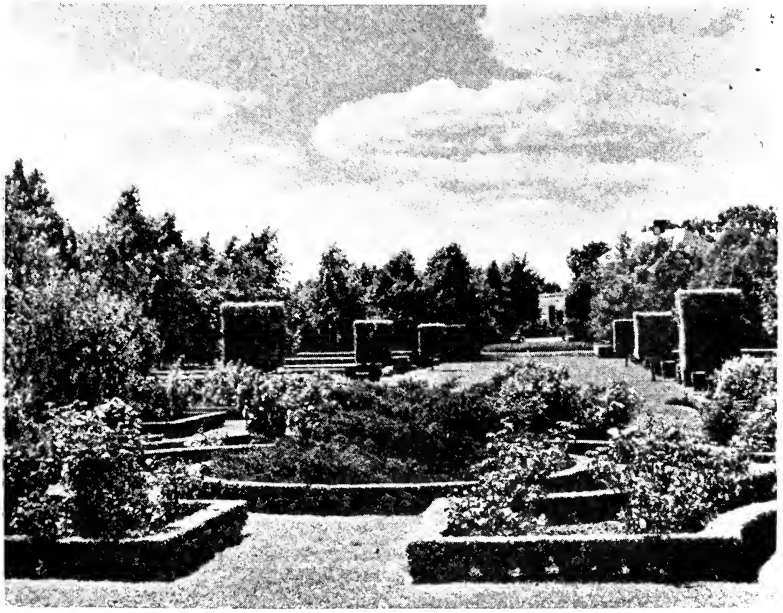
Examples

Potentially many of the smaller and recently established arboretums give promise of strong development in the future. The suggestions and lists which follow definitely do not include all the arboretums in this country. Some are mentioned merely in an attempt to point out the different kinds of arboretums in this country. They are listed in this manner merely to serve as examples in fostering the

Courtesy of the Morton Arboretum, Lisle, Illinois

PLATE VIII

The beautiful Thornhill Building of the Morton Arboretum. Completed in the summer of 1942, it was erected on the site of the Joy Morton residence and incorporates the library wing of the building. It contains lecture halls, laboratories and administrative offices and was especially planned to provide facilities for the expansion of the Arboretum educational program.



Courtesy of the Morton Arboretum, Lisle, Illinois

PLATE IX

The hedge collection from the rose garden at the Morton Arboretum, Lisle, Illinois. This collection contains nearly 200 different kinds of hedges—one of the most complete hedge collections in this country.

idea of the "Park Arboretum" and no intention has been made to include them all.

1. **Small Collections:**—It seems to be desirable to mention a few outstanding small collections merely to show what is being done along this line. These are not arboretums as described in this paper. Examples of other important collections of plants would be the rose garden of the Hartford Park Department; the collection of lilacs of the Park Department of Lombard, Illinois; the very valuable collection of fruits of the New York State College of Agriculture at Geneva, New York, and other experiment stations; the important collections of woody plants at various places under the supervision of the Bureau of Plant Introduction of the United States Department of Agriculture; and many very valuable collections in nurseries throughout the land—all these are excellent **collections** and should certainly not be overlooked. They are not mentioned here because they do not conform to all the requisites of a true arboretum.

Hemlock Arboretum, "Far Country," Kitchen's Lane, Germantown, Pennsylvania. Mr. Charles Jenkins, the owner, has approximately $7\frac{1}{2}$ acres of land around his home which was built in 1917. In 1931 he became interested in collecting hemlock species and varieties, and at the present time has over 150 species and varieties—the most complete collection in this country if not in the world. Most of the plants are small, but the older they grow the more valuable this collection becomes. Mr. Jenkins publishes a leaflet from time to time describing some of his plants and thus in this and in other ways promotes the interest of botanists and home owners alike in this interesting group of plants.

Breeze Hill, Harrisburg, Pennsylvania. Mr. J. Horace McFarland has probably grown more varieties of plants on his 2.4 acres of ground than anyone else in this country. As owner of a horticultural printing establishment, he needs authentic pictures of all sorts of plants. In 1941 he was growing 888 varieties of roses alone and in addition 1,164 species and varieties of other plants. He employs a gardener with two or three part-time assistants and has proved that a great deal can be done in a very small space when intelligently operated.

Westtown Boys School, Westtown, Pennsylvania. A boy's school, founded in 1799, has been accumulating a collection of trees over a long period of time. Because of lack of space and funds, it is at present specializing on the firs, trying to obtain all species and varieties that it is possible to grow at Westtown. Some thirty different kinds are already established.

Eddy Arboretum, near Placerville, California. This is a tree breeding unit operated by the Institute of Forest Genetics of the California Forest and Range Experiment Station, and is chiefly concerned with rapid growing pines. There are now some seventy species and twenty-five varieties with various hybrids of pines growing there, many of the trees fifteen to eighteen years old and sixty feet tall, planted in rows fifteen feet apart, varying from one to thirty specimens in each group.

2. **Small arboretums:**—It would be impossible to list completely every collection

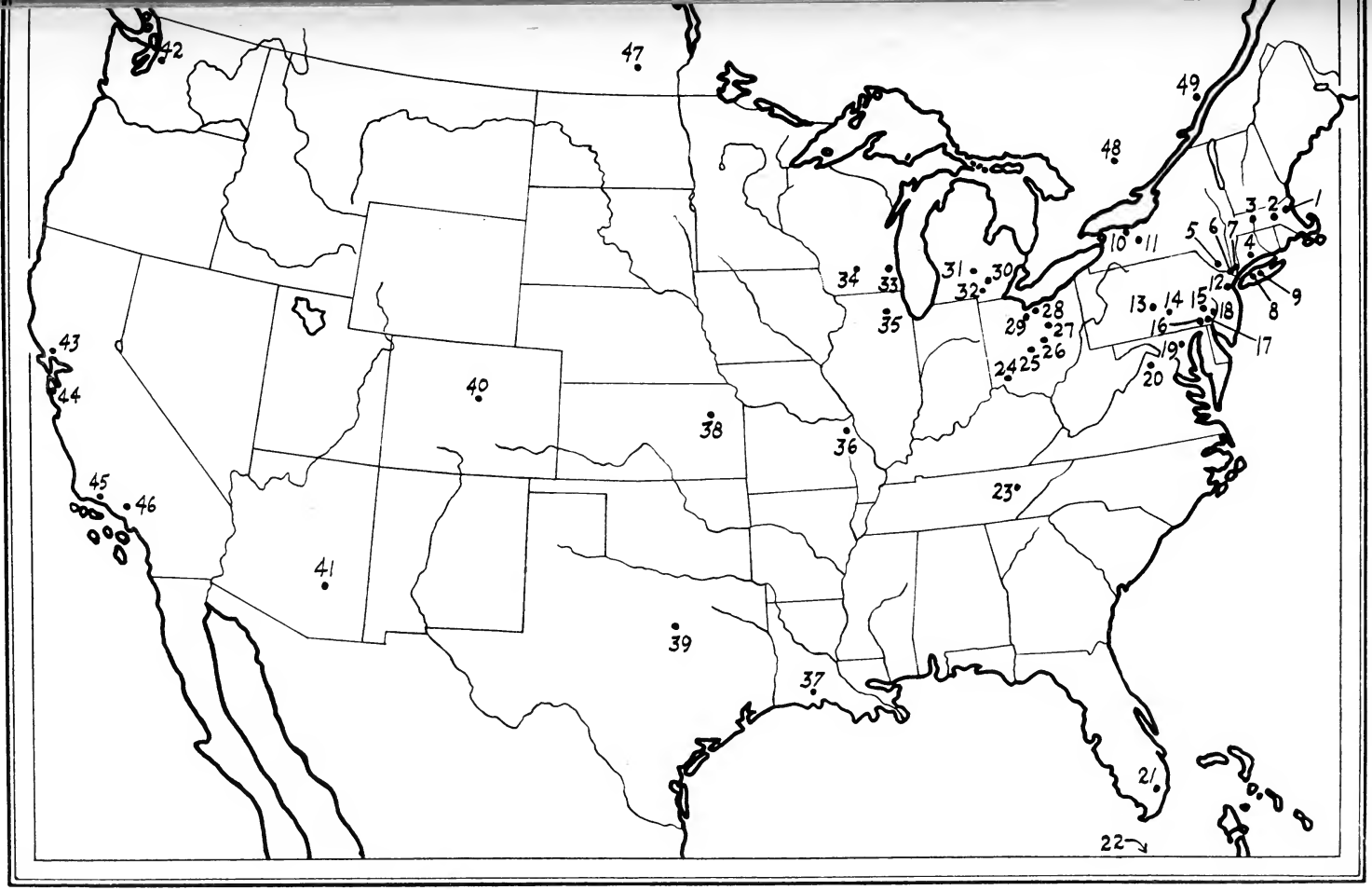


PLATE X

Map of the United States showing the locations of the arboretums listed on pages 46-48

of plants which might be considered to come under this heading. Some are listed on the accompanying map, all of which have more than 300 different kinds of labeled woody plants, but less than 2,000. After the war, doubtless many of these will become active, and accumulate larger collection, and many other potential arboretums not listed here will be able to keep their plants properly labeled and so might later be included in this group. The division of the arboretums in this country into two groups is done merely as an aid to committees entrusted with the planning of Park Arboretums, so that such groups will know where to turn for practical information and advice.

Small Arboretums

Arboretum of the Barnes Foundation, Merion, Pennsylvania, 17

Blandy Experimental Farm, Boyce, Virginia (University of Virginia), 20

Boyce Thompson Southwestern Arboretum, Superior, Arizona (Boyce Thompson Institute, Yonkers, New York), 41

Breeze Hill, Harrisburg, Pennsylvania (J. Horace McFarland), 14

Cornell Plantations, Cornell University, Ithaca, New York, 11

Dawes Arboretum, Newark, Ohio, 26

Ellis College Arboretum, Newtown Square, Pennsylvania, 15

Experimental Farm, Morden, Manitoba, Canada (Canadian Government Department of Agriculture), 47

Fort Worth Botanic Garden, Fort Worth Texas, 39

Childs Frick Arboretum, Roslyn, New York, 8

Golden Gate Park, San Francisco, California (City of San Francisco), 44

Holden Arboretum, Cleveland, Ohio (Cleveland Museum of Natural History),28

H. H. Hunnewell Arboretum, Wellesley, Massachusetts (Walter Hunnewell), 2

Indian Hill Arboretum, Topeka, Kansas (Dr. Carl A. Menninger), 38

Jungle Gardens, Avery Island, Louisiana (E. A. McIlhenny), 37

Michigan State College, (Campus), East Lansing, Michigan, 31

Robert E. More Arboretum, Buffalo Creek, Colorado, 40

Marsh Botanical Garden, Yale University, New Haven, Connecticut, 4

Morris Arboretum, Chestnut Hill, Philadelphia, Pennsylvania (University of Pennsylvania), 18

New Jersey Agricultural Experiment Station, New Brunswick, New Jersey, 12

Nichols Arboretum, Ann Arbor, Michigan (University of Michigan), 30

Oberlin College Arboretum, Oberlin, Ohio, 29

Ohio State University (campus), Columbus, Ohio, 25

Stanley M. Rowe Arboretum, Cincinnati, Ohio, 24

Sanford Arboretum, Knoxville, Tennessee (A. F. Sanford), 23

Santa Barbara Botanic Garden, Santa Barbara, California, 45

"Skylands," Sterlington, New York (Clarence McK. Lewis), 5

Slayton Arboretum, Hillsdale, Michigan (Hillsdale College), 32

Smith College (campus), Northampton, Massachusetts, 3

State Institute of Applied Agriculture, Farmingdale, Long Island, New York, 9

University of California Botanic Garden, Berkeley California, 43

University of Maryland Arboretum, College Park, Maryland, 19

University of Wisconsin Arboretum, Madison, Wisconsin, 34

Whitnall Arboretum, Hales Corners, Wisconsin (Milwaukee County Park Commission), 33

Wooster Arboretum, Ohio Agricultural Experiment Station, Wooster, Ohio, 27

3. **Large Arboretums:**—These constitute the largest collections of labeled woody plants in this country, mostly having more than 2,000 species and varieties of labeled woody plants growing out of doors.

Atkins Institution of the Arnold Arboretum, Soledad, Cuba, 22.

Established 1899; 222 acres; large collections of tropical woody plants and palms. Endowed.

Owned and operated by Harvard College.

Arthur Hoyt Scott Horticultural Foundation of Swarthmore College, Swarthmore, Pennsylvania, 16.

Established 1930. About 50 acres—collections of "the best" varieties of woody plants as well as narcissus, tree peonies, etc. Endowed.

Owned and operated by Swarthmore College.

Arnold Arboretum, Jamaica Plain, Massachusetts, 1

Established 1872. 265 acres—large collections of hardy woody plants exclusive of economic fruit varieties. Endowed.

Operated as a unit of Harvard University. The land originally owned by Harvard University but deeded to the City of Boston in 1883 and leased to Harvard University for a term of 999 years with renewal provisions of $1.00 per year. This is the oldest arboretum in the United States.

Brooklyn Botanic Garden, Brooklyn, New York, 7

Established 1910. 50 acres. Collection of woody plants as well as waterlilies and herbaceous plants. Partly endowed, partly supported by the New York City Tax Budget Appropriations.

Owned and operated by the Brooklyn Institute of Arts & Sciences.

Dominion Arboretum and Botanical Garden, Ottawa, Canada, 48

Established 1889. 65 acres. Collections of woody plants.

Owned and operated by the Canadian Government.

Fairchild Tropical Garden, Dade County, Florida, 21

Organized 1935. 83 acres. Collections of palms and other tropical and semi-tropical woody plants. Endowed.

Operated by the Fairchild Tropical Garden.

Highland and Durand-Eastman Parks, Rochester, New York, 10

Established about 1907. About 600 acres. Collections of hardy woody plants.

Owned by the City of Rochester, operated by the Park Department.

Huntington Botanical Garden, San Marino, California, 46

Established 1927. 207 acres. Collections of woody plants as well as cacti and succulents. Endowed.

Owned and operated by the Henry E. Huntington estate.

Masonic Homes, Elizabethtown, Pennsylvania, 13
Established 1910. 1200 acres. Collections of ornamental woody plants. Endowed.
Owned and operated by the Grand Lodge (Pennsylvania) of Free and Accepted Masons.

Missouri Botanical Garden, St. Louis and Gray's Summit, Missouri, 36
Established 1889. 1675 acres (chiefly at Gray's Summit). Collections of woody plants, water lilies, orchids, cacti and succulents, etc. Endowed.
Owned and operated by the Missouri Botanical Garden.

Montreal Botanic Garden, Montreal, Canada, 49
Established 1936. 600 acres. Collections of hardy woody plants, economic plants, perennials, tender plants in display greenhouses, etc.
Owned and operated by the City of Montreal.

Morton Arboretum, Lisle, Illinois, 35
Established 1922. 800 acres. Collections of hardy woody plants exclusive of fruits.
Endowed. Owned and operated by the Morton Arboretum.

New York Botanical Garden, Bronx Park, New York, New York, 6
Established 1895. 280 acres. Collections of hardy woody plants and many exotic tender plants in large display greenhouses.
Partly endowed, partly supported by New York City Tax Budget appropriations.
Owned and operated by the New York Botanical Garden Corporation.

University of Washington Arboretum, Seattle, Washington, 42
Established 1934. 260 acres. Collections of hardy woody plants.
Owned and operated by the University of Washington.

References

The following references are merely a few to indicate that there are lists of "the best" varieties of shrubs and trees which might be first planted by the new Park Arboretum. Many more references could be quickly obtained by an inspection of the larger horticultural libraries of this country.

Chadwick, L. C. Compiling a new nursery list. Published by the American Nurseryman, Chicago, 96 pp., 1939.

Ihrig, Herbert A report of the hardiness of rhododendrons, Winter of 1942-1943. Arb. Bull. Univ. of Washington Arb., Seattle. pp. 20-23. December, 1943.

McDaniels, L. H. Nut growing in the Northeastern States. Arnoldia. 1: 45-64. October 31, 1941.

Russell, Paul The Oriental flowering cherries. U. S. Dept. Agr. Circular No. 313. March, 1934.

Wister, John Lilacs for America. Arthur Hoyt Scott Horticultural Foundation, Swarthmore, Pennsylvania. 1-64. April, 1942.

Wyman, Donald Crab apples for America. American Association of Botanical Gardens and Arboretum. 1-81. July, 1943.

Also many other lists can be found in the following publications:
Arnoldia, and past issues of the Bulletin Of Popular Information, Arnold Arboretum, Jamaica Plain, Massachusetts.
Morton Arboretum Bulletin, Lisle, Illinois.
University of Washington Arboretum Bulletin, Seattle, Washington.
Missouri Botanical Garden Bulletin, St. Louis, Missouri.

DONALD WYMAN

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 | October 5, 1945 | NUMBER 8

REPORT ON THE ARNOLD ARBORETUM HEDGE DEMONSTRATION PLOT*

MOST of the 115 hedges in the hedge demonstration plot were planted either in the fall of 1936 or in the spring of 1937. The majority have grown well since and it seems to be advisable to make a report on their growth performance to date. They have received a minimum amount of care. The grass walks between them have been mowed regularly, and all plantings have received at least one application of well-rotted manure. Most of the deciduous hedges were cut to within six inches of the ground when they were planted, this being done in order to insure bushy growth. Of course, the evergreen hedges were not treated this way, their growth now being largely proportional to the size of the plants when they were originally received.

Pruning or clipping has been held to a minimum, usually done on deciduous as well as evergreen hedges during the latter part of June or the early part of July at a time when the current year's growth was about complete. One pruning or clipping at this time was usually sufficient each year, although a few of the plants needed an additional light clipping in the fall. This additional clipping was the exception rather than the rule. All hedges have been clipped in the same form, i.e., narrow and slightly rounded at the top and wider at the base, since this slightly triangular shape is conducive to best hedge growth.

Seven plants were placed in each of the taller-growing hedges and ten plants were placed in most of the lower growing ones, the length of each hedge after planting being approximately twenty-five feet. Full details concerning the plot as it was originally planted, together with a plan, will be found in the Bulletin

*A similar article under this title will appear in Vol. 47 of the Proceedings of the American Society for Horticultural Science., now in press.

of Popular Information of the Arnold Arboretum. (Series 4, Vol. VI, No. 14, Dec. 1938.)

A large number of these hedges have proved to be satisfactory up to this time. The advantages of using one kind of plant material in preference to another depends on the purposes for which the hedge is intended. Such important items as the size of the leaves, presence or absence of thorns, color of flowers and fruit, and texture, all enter into the selection of plant material for hedges, but these are not considered in this paper. This report is based primarily on growth made to date for it is of value merely to note the large number of species that have grown into good hedges since this demonstration plot was planted. Good hedges are bushy at the base; and many of these plants have grown together in the hedge rows to make continuous masses of plant materials and give every indication of responding well to clipping in the future.

Some of the hedges have not proved to be satisfactory within this trial period, and the species are listed together with the reasons why they have proved to be unsuitable. Some, especially those that have been recently planted, are still too small to be judged properly at this time.

The chief object in this demonstration plot has been to keep all the hedges comparatively low, to give them identical care, and to keep them sufficiently restrained so that they can be clipped easily by a man standing on the ground. This is comparatively easy with *Taxus* species; not so easy with the more vigorous growing *Acer* species. Minor accidents have occurred to plants here and there in the plot, but as a whole they have grown well. This report deals only with the amount of growth the different plants have made as clipped hedges under Arnold Arboretum conditions, from the time of planting (1936–37) to the present.

LIST I

Plants which have proved to be satisfactory as hedges.

NOTE: These are all very dense, well branched completely to the ground and grown together to form continuous hedges. Naturally their *texture* varies with size of leaf. Interest varies with flower, fruit and autumn color. But as eight-year old hedges, they are all satisfactory at their respective heights and widths. The figures in the second column are the original heights of the plants as they come from the nursery. Those marked (°) were cut to within 6″ of the ground immediately after they were planted in order to force them to branch well from the base.

Name	Year planted	Height of plants prior to planting	Height of clipped hedge Dec. 1, '44	Width of clipped hedge Dec. 1, '44
Acer campestre	1936	° 2–4′	4′	4′6″
Acer Ginnala	1936	° 5–6′	5′	5′
Berberis mentorensis	1936	° 2′	4′	3′6″
Berberis Thunbergii	1936	° 15″	3′	3′
Berberis Thunbergii atropurpurea	1936	° 15″	3′	3′
Berberis Thunbergii erecta	1936	12–15″	2′6″	1′6″
Berberis Thunbergii minor	1936	° 12–15″	2′	1′6″
Berberis vulgaris	1936	° 3–4′	3′3″	2′6″
Berberis vulgaris atropurpurea	1936	° 2–3′	3′3″	2′6″
Buxus microphylla koreana	1936	6–9″	1′6″	1′3″
Buxus microphylla koreana hybrid	1936	6–9″	1′6″	1′3″
Carpinus betulus	1936	° 18–24″	5′3″	6′
Carpinus caroliniana	1936	° 4–5′	5′3″	6′
Chamaecyparis pisifera filifera	1936	3′	5′6″	4′6″
Chamaecyparis pisifera plumosa	1936	12–18″	2′9″	3′3″
Chamaecyparis pisifera squarrosa	1936	$2\frac{1}{2}$–3′	3′6″	3′6″
Cornus mas	1936	° 2–3′	2′6″	2′6″
Crataegus crus-galli	1936	° 2–3′	3′	2′9″
Crataegus monogyna	1936	° 2–3′	3′ 3″	3′
Crataegus Phaenopyrum	1936	° 2–3′	4′	3′
Elaeagnus angustifolia	1936	° 18–24″	3′6″	3′9″
Elaeagnus umbellata	1936	° 3′	4′9″	4′3″
Euonymus alata compacta	1936	° 2–3′	3′6″	3′9″
Fagus grandifolia	1936	° 3–4′	2′9″	3′
Fagus sylvatica	1936	° 6–12″	2′6″	2′9″

Forsythia intermedia	1936	° 18–24″	3′9″	3′3″
Ligustrum amurense	1936	° 6–12″	3′	2′6″
Ligustrum ibolium	1936	° 18–24″	2′9″	2′9″
Ligustrum obtusifolium Regelianum	1936	° 2′	3′	2′6″
Ligustrum ovalifolium	1936	° 18″	2′9″	2′
Ligustrum vulgare	1936	° 2–3′	2′9″	2′6″
Lonicera fragrantissima	1936	° 2–3′	4′3″	4′6″
Philadelphus coronarius	1936	° 2–3′	4′9″	4′
Physocarpus opulifolius	1936	° 2–3′	5′3″	4′9″
Picea Abies	1936	3′	4′	4′3″
Picea pungens glauca	1936	2–3′	3′6″	3′3″
Pinus Strobus	1936	18″	3′6″	3′
Platanus acerifolia	1936	° 2–3′	6′	5′
Prunus tomentosa	1940	° 2′	3′6″	2′9″
Quercus imbricaria	1938	° 2′	4′	3′9″
Quercus palustris	1936	° 6–8′	5′9″	5′6″
Rhamnus cathartica	1936	° 2–3′	3′6″	3′
Rhamnus Frangula	1936	° 2–3′	3′6″	3′
Ribes alpinum	1939	° 10″	2′	2′
Spiraea prunifolia	1936	° 2–3′	3′	2′6″
Spiraea Thunbergii	1936	° 2–3′	2′3″	2′6″
Syringa vulgaris	1936	° 2–3′	3′	3′
Taxus canadensis stricta	1936	8–10″	1′3″	1′6″
Taxus cuspidata	1936	15–18″	2′3″	2′6″
Taxus cuspidata capitata	1936	15–18″	2′6″	2′6″
Taxus cuspidata nana	1936	12–15″	1′6″	2′3″
Taxus media (hedge form)	1936	18–24″	2′	2′
Taxus media Hatfieldii	1936	18–24″	2′	2′
Taxus media Hicksii	1936	2–3′	2′	2′6″
Thuja occidentalis	1936	2′	3′	2′3″
Thuja occidentalis globosa	1936	18″	2′6″	2′3″
Thuja occidentalis robusta	1936	2–2½′	3′	2′6″
Thuja occidentalis "Little Gem"	1938	6–9″	1′6″	2′6″
Thuja plicata	1936	9–12″	3′3″	2′
Tilia cordata	1936	9–12″	6′	6′
Tsuga canadensis	1939	18″	3′3″	2′9″
Tsuga caroliniana	1936	18″	3′	2′9″
Viburnum dentatum	1936	° 2–3′	3′3″	2′9″
Viburnum prunifolium	1936	° 2–3′	3′3″	3′

LIST II

Hedge Plants — Second Choice

NOTE: These are decidedly second choice *at present*, being rather slow in growth or slightly open at the base or both.

Name	Year planted	Height of plants prior to planting	Height of clipped hedge Dec. 1, '44	Width of clipped hedge Dec. 1, '44
Abies concolor	1936	12–15″	4′	3′6″
Acanthopanax Sieboldianus	1936	° 2–3′	3′9″	2′6″
Betula populifolia	1936	° 4′	3′9″	3′6″
Caragana arborescens	1936	° 3–4′	3′	2′9″
Cornus racemosa	1936	° 2–3′	2′6″	2′3″
Juniperus virginiana	1936	2–3′	3′6″	2′9″
Lonicera tatarica	1936	° 2–3′	4′	2′9″
Picea Omorika	1936	12–15″	2′6″	3′3″
Picea orientalis	1936	3–6″	2′9″	2′2″
Pseudotsuga taxifolia	1936	15″	2′9″	2′6″
Salix pentandra	1936	° 3′	4′9″	4′
Spiraea nipponica	1936	° 18–24″	3′9″	3′
Spiraea Vanhouttei	1936	° 18–24″	3′9″	3′
Syringa chinensis	1936	° 3–4′	3′	3′
Thuja occidentalis Woodwardii	1936	12–15″	2′	1′9″
Viburnum Lantana	1936	° 2–3′	4′	3′9″

° Cut to within 6″ above the ground immediately after transplanting in order to make a hedge which was well branched close to the ground.

LIST III

Plants of as yet doubtful value in hedges but which may prove to be satisfactory later.

NOTE: These are either recently planted and too young as yet to be properly judged, or else there is something wrong with them that would appear to make them inferior to those plants in List I.

Acer platanoides	Very open at base.
Caragana frutex	Only recently planted.
Chaenomeles lagenaria	Only recently planted.
Hypericum densiflorum	Very open at the base.
Ilex crenata convexa	Only recently planted.
Ilex opaca	Only recently planted.
Pinus nigra	All plants died within three years.
Populus alba pyramidalis	Apparently of too vigorously upright growth habit to be well filled out at the base.
Populus nigra italica	Apparently of too vigorously upright growth habit to be well filled out at the base.
Prinsepia sinensis	Only recently planted.
Prinsepia uniflora	Only recently planted.
Prunus japonica Nakaii	Only recently planted.
Quercus robur fastigiata	Dense at top and open at base. Apparently of too vigorously upright growth habit to be well filled out at the base.
Salix purpurea	Few branches at base. Badly infested with oyster shell scale.
Salix purpurea gracilis	Slight infestation of oyster shell scale but apparently an excellent low hedge.
Syringa Josikaea	This has proved to be a consistently poor grower in our plot for some unknown reason. It should be a vigorous growing shrub.
Thuja occidentalis Wagneriana	Too upright in habit—grows laterally, very slowly, hence it has made a poor hedge. If plants had been spaced 18″ or less apart, it might have proved to be satisfactory.
Ulmus pumila	This should make an excellent hedge. Our plants were poor to begin with and this may be the reason why these have made a very poor hedge up to this time.

LIST IV

Plants which have proved to be decidedly inferior as hedges.

NOTE: These are definitely inferior as low hedges under Arnold Arboretum conditions. Some may have died or been susceptible to a serious pest. There is nothing about their performance to date that would suggest these species be selected for hedges if those in Lists I and II were available.

Abies Fraseri	Not vigorous enough in growth under our conditions to compete with more strongly growing species.
Cercidiphyllum japonicum	Half of these plants are having a hard time getting started. The other half look as if they are so upright in growth habit that they will be open at the base.
Clethra alnifolia	Very poor growth. Our plants are growing in a very dry soil which is probably the cause for the poor development, for with us this is typically a plant of very wet places. At Gloucester, Massachusetts, under moist growing conditions, this has been clipped and forms a fairly dense hedge.
Deutzia gracilis	Died back repeatedly. Did not make a good hedge
Ginkgo biloba fastigiata	Does not grow vigorously at the sides, hence makes a poor hedge.
Gleditsia triacanthos	Much too open to compete with other plants as a small hedge.
Hippophae rhamnoides	Very difficult to get established under our conditions. Not to be recommended as hedge material.
Juniperus communis	Parts of plants died after shearing and were unsightly. Had to be removed.
Lonicera Korolkovii floribunda	Apparently very difficult to get this established. This was replanted three different times and finally was given up as too difficult to handle as a hedge.
Maclura pomifera	Does not grow well under our conditions.
Philadelphus coronarius pumilus	Does not make a good hedge.
Pinus Mugo	All dead. Plants became quickly infested with scale and soon died.
Pinus Mugo Mughus	Became severely infested with scale and gradually died out. If scale can be kept under control,

	this plant should make a very dense, low, flat hedge.
Pinus sylvestris	Two plants died within two years after transplanting. As a hedge, it is not as satisfactory as Pinus Strobus.
Rosa rugosa	Became severely infested with a twig borer which ruined the plants.
Rosa virginiana	Not sufficiently dense for a clipped hedge. Does not compare favorably with others for this purpose
Spiraea Bumalda	Most of the plants died and the remainder were removed.
Symphoricarpos albus laevigatus	Too loose and open in growth. Not sufficiently dense nor vigorous enough for a clipped hedge.
Tamarix pentandra	Most of plants winter killed badly and had to be removed.
Thuja occidentalis spiralis	Rather open at top and makes a poor hedge for this reason.
Viburnum Opulus nanum	Nine of the ten plants died within three years. These were growing in poor soil but should have proved to be hardy. Another trial in another location should be conducted.

DONALD WYMAN

Fogg, John M., Jr. Weeds of Lawn and Garden. Philadelphia, Univ. of Penn. Press. p. 1–215, *illus.* 1945. Price $2.50. — This excellent little book, of a size which can be easily carried around, is written for the average gardener by a prominent botanist who has been interested in the subject of garden weeds for years. One hundred and seventy five common garden weeds are described and pictured in such a popular fashion that they can be easily identified. Sufficient information is given about each weed to enable one to identify it properly from the excellent line drawings. The habitat of each weed and method of growth is also given, and what is most important, a method of control. All this information about each is contained in a two-hundred-word paragraph appearing on the bottom half of the page, the top half containing an excellent line drawing of the young weed before flowering stage, and the mature plant in flower, thus enabling one to identify it at any time. An excellent, practical, workable book — it should be kept within reach of everyone with a garden.

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 November 23, 1945 NUMBER 9

VIBURNUMS FOR THE NORTHERN UNITED STATES

THE viburnums are among the most serviceable of all shrubs. They have interesting flowers in the springtime; most of them have splendid green foliage throughout the summer; colorful fruits in the late summer, fall, and even the winter; and most of them have brilliant autumn foliage color. Here is a group of plants which has ornamental value every season of the year. Some kinds of plants, like the lilacs for instance, we may carefully grow fifty weeks of the year in order to enjoy them in flower for two weeks. The viburnums, on the other hand, are usually of ornamental value at least two seasons of the year, sometimes three and even four. They have no serious pests, need little pruning, and in fact require little, if any, attention. They can be grown over a wide area of the United States and Canada and hence are to be highly recommended for many situations and for many uses in the garden. The following paragraphs concerning viburnums for the eastern and northern United States are written to augment the accompanying chart in which specific information about each one of the better species can be found.

Viburnums valued for flowers

The first of the species to bloom in the Arnold Arboretum is *Viburnum fragrans*, ordinarily starting to flower in March or very early April. This blossoms so early in the season, that the flowers are frequently killed by freezing weather. In fact, the flower buds themselves may be injured during the winter months by low temperatures. Farther south, it is not so susceptible to winter injury and hence is more valuable as a landscape plant than in the North. *Viburnum Carlesii* is the second to bloom, starting about the end of April and being in full bloom the first week in May. Because it blooms later, the flowers are not often injured, so it is much better than *V. fragrans* for gardens in the North. Both of these plants are unusual among viburnums in that they have clusters of small pink, trumpet-shaped flowers similar to those in shape and color of the native flowering arbutus and al-

most as fragrant. *Viburnum Juddii*, a hybrid of *V. Carlesii* and *V. bitchiuense*, has white flowers and at the Arnold Arboretum has proved a superior plant to both. These three and *Viburnum Burkwoodii*, another similar hybrid, are the only ones used in the North with pleasingly fragrant flowers.

Three viburnums are valued for their large sterile flower clusters and are commonly called snowballs. The first, *Viburnum Opulus roseum* (*V. Opulus sterile* in the trade) has been in this country longest, but is not desirable because the young shoots and flower clusters are susceptible to severe infestations of plant lice which mar and disfigure the plants. *V. tomentosum sterile* (*V. tomentosum plicatum* in the trade) has been in this country only since 1865 (introduced from Japan); it is the more desirable type of snowball for the North simply because it is not as susceptible to plant lice infestations as is the preceding species. Unfortunately, it is slightly less hardy than the European snowball. Both are planted everywhere for their conspicuous, large white flower clusters in May. In the South, the Chinese snowball (*V. macrocephalum sterile*) is prominent everywhere. It has much the largest flower clusters, and even though a plant is growing in the Arnold Arboretum, it is not reliably hardy north of Washington, D.C.

The rest of the viburnums used in the North ordinarily have large flat clusters, made up of very small, creamy-white flowers which, in appearance, are very similar to Queen Anne's lace. One or two, like *V. Sargenti*, *V. alnifolium* and *V. Opulus* have a few sterile flowers rimming the outside of the clusters, making them slightly more conspicuous. Although the majority of the viburnums may not be valued for conspicuously beautiful flowers, nevertheless these are borne in such profusion that most are prominent in the landscape when in full bloom.

Plants attracting birds

All the viburnums except those with sterile flowers have fruits which are most attractive to birds. The fleshy fruits usually contain one flattened seed and the fleshy outside layer of the fruit is often brilliantly colored. The U.S. Department of Agriculture records show that one plant in particular, *V. prunifolium*, has attracted the following birds which were observed to eat its fruits:—

Ruffed grouse	Robin
Yellow-billed cuckoo	Eastern bluebird
Flicker	Cedar waxwing
Catbird	Rose-breasted grosbeak
Brown thrasher	Purple finch

To this list undoubtedly could be added many other birds, and it is safe to say that in general all viburnums in fruit attract a great many different kinds of birds, possibly more than any other group of fruiting woody plants except the cherries and the crab apples. In reference to this note on fruits it must be admitted that those of *V. Lentago* have a disagreeable goat-like odor, hence the common name of nanny-berry or sheep-berry.

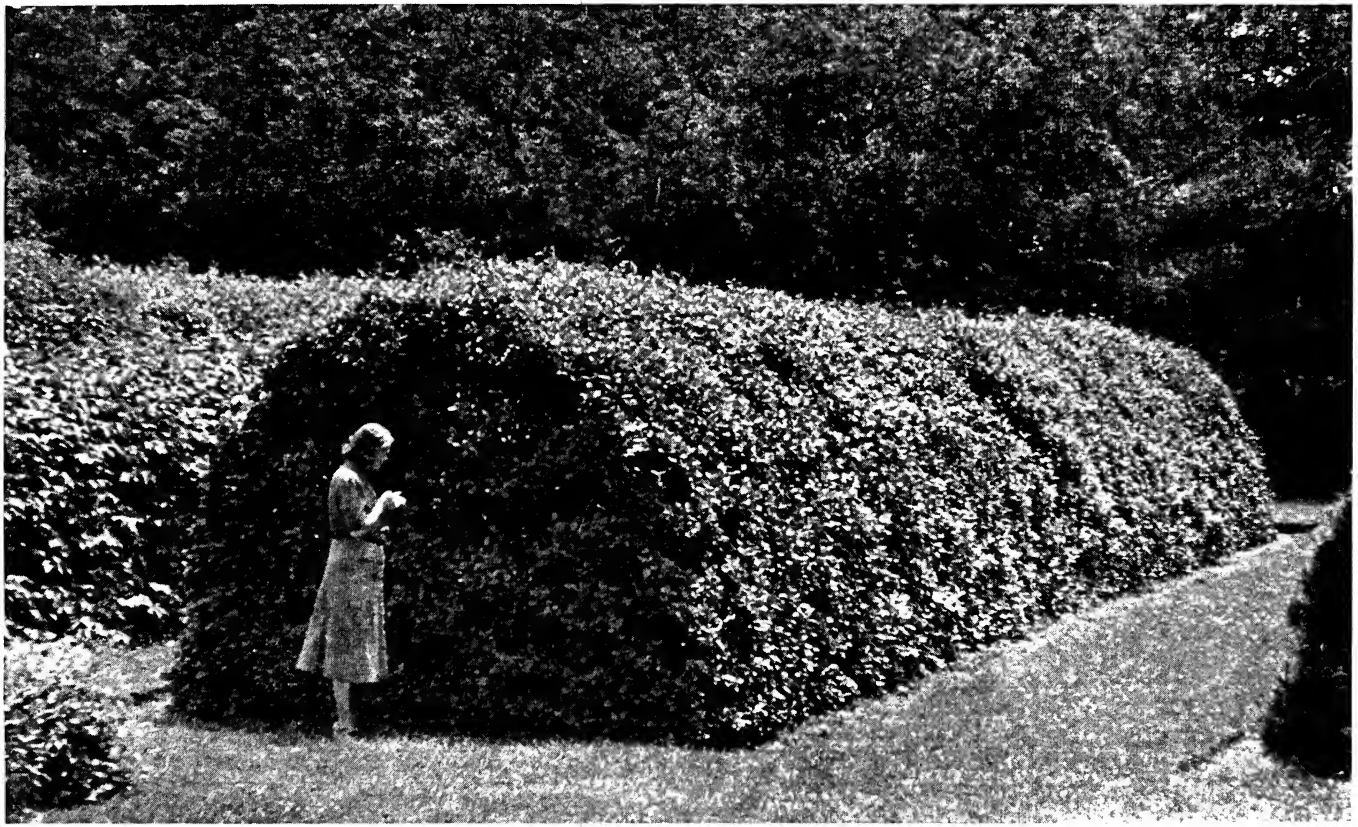


PLATE XI

Viburnum Lantana grown as a hedge in the Canadian Government Experimental Garden at Ottawa, Canada. Several other viburnums will also form good hedges.

VIBURNUM	*Date of Introduction or Origin*	*Native of*	*Time of Effective Fruit*	*Color of Fruit*	*Value of Fruit*	*Value of Flower*	*Approximate Height*	*Zone of Hardiness*
acerifolium	Native	Northeastern U.S.	F	black	—	—	6′	3
alnifolium	Native	Northeastern U.S.	S	red to black	*	*	12′	3
betulifolium	1901	Central and W. China	F	red	**	—	12′	5
Burkwoodii	orig. 1924	Hybrid	S	black	—	**	8′?	5
Carlesii	1902	Korea	S	black	—	**	5′	4
cassinoides	Native	Northeastern U.S.	F	red to black	**	*	6′	3
Davidi	1904	W. China	F	blue	*	—	3′	7
dentatum	Native	Eastern U.S.	SF	blue	*	**	15′	2
dilatatum	before 1845	Eastern Asia	FW	red	**	**	9′	5
dilatatum xanthocarpum	1919	garden form	FW	yellow	**	**	9′	5
erubescens	1910	C. China	F	red to black	*	—	15′	5
fragrans	1910	Northern China	S	red to black	—	* (zone 5) **(zone 6)	9′	5
Henryi	1901	C. China	F	red to black	*	—	9′	7
japonicum	1859	Japan	F	red	*	*	6′	7
Juddii	1920	Hybrid	S	black	—	**	15′	5
Lantana	prior to 1790?	W. Asia & Europe	F	red to black	*	—	15′	3
Lentago	Native	Eastern U.S.	FW	black	**	*	30′	2
lobophyllum	1901	C. & W. China	FW	red	**	*	15′	5
macrocephalum Keteleeri	prior to 1860?	China	F	black	—	*	12′	5
macrocephalum sterile	1844	garden form from China	—	—	—	**	12′	6
molle	Native	Central U.S.	F	blue black	*	—	12′	5
nudum	Native	Eastern U.S.	FW	blue black	*	*	15′	6
odoratissimum	1820?	India to Japan	S	red to black	*	**	10′	9
Opulus	prior to 1790	Europe, N. Africa, N. Asia	FW	red	**	**	12′	3

Opulus nanum	orig. prior to 1845	garden form	—	—	—	—	3′	3
Opulus roseum	orig. prior to 1750	garden form	—	—	—	**	12′	3
Opulus variegatum	orig. prior to 1770	garden form	FW	red	**	**	12′	3
Opulus xanthocarpum	orig. prior to 1840	garden form	FW	yellow	**	**	12′	3
prunifolium	Native	Eastern U.S.	FW	blue black	**	**	15′	3
pubescens	Native	Eastern U.S.	FW	blue black	*	*	9′	5
Rafinesquianum	Native	Eastern U.S.	F	blue black	—	**	6′	2
rhytidophyllum	1900	C. & W. China	F	red to black	—	—	9′	5
rufidulum	Native	Southeastern U.S.	F	dark blue	*	*	30′	5
Sargenti	1892	N.E. Asia	SF	scarlet	**	**	12′	4
Sargenti flavum	1904	garden form	SF	yellow	**	**	12′	4
setigerum	1901	C. & W. China	F	red	*	*	12′	5
setigerum aurantiacum	1907	garden form	F	orange	**	*	12′	5
Sieboldii	1880	Japan	S	red to black	**	**	30′	4
suspensum	about 1875?	S. Japan	S	red	*	—	6′	9
tinus	prior to 1790?	Southern Europe	F	black	*	*	10′	9?
tinus hirtum	—	Southern Europe	F	black	*	*	10′	9?
tinus lucidum	—	Southern Europe	F	black	*	**	10′	9?
tinus purpureum	—	Southern Europe	F	black	*	*	10′	8?
tinus variegatum	—	Southern Europe	F	black	*	*	10′	8?
tomentosum	1865	Japan & China	S	red to black	**	**	9′	4
tomentosum sterile	1844	garden form	—	—	—	**	9′	4
trilobum	Native	So. Canada & No. U.S.	FW	red	**	**	12′	2
utile	1901	China	F	blue black	*	*	6′	9
Veitchii	1901	Central China	F	red to black	*	*	6′	5
Wrightii	1892	Japan	FW	red	**	**	9′	5

PLATE XII

The two snowballs for the North. Left, the European snowball, *Viburnum Opulus roseum*, which is so frequently infested with lice. Note disfigured leaves at base of twig. Right, the Japanese snowball, *V. tomentosum sterile*, which is not quite as hardy but is not infested with lice.

Landscape use

As a group, the majority of the viburnums are vigorous growing shrubs which enjoy good sunny locations and can be used in mass plantings or as specimens; there is probably nothing nicer than a specimen plant of the tree-like *V. Sieboldii*, which is noted for its billowy masses of dense dark green foliage. The exotic viburnums, particularly, are used as specimens while many of the native types are used in naturalized plantings. However, *V. acerifolium* and *V. alnifolium*, and possibly one or two others, need the shade and often the cool, moist conditions of the woods in order to do their best. These do not grow well in full sun.

As a rule, viburnums are most valued for their colorful fruits and are among the shrubs outstanding in this respect. Some of the fruits are black: while the fruits of others, like *V. Sieboldii*, change from a light green to red, and eventually to black before they fall from the plant. Others, like *V. cassinoides*, have fruits with various colors for as they change from green to red to black, often in the same clusters the various colors will be present at the same time. As noted in the table, the fruits of some, like *V. Opulus*, remain on the plants all winter long (that is, when there are not too many birds in the vicinity), a most desirable characteristic; while the fruits of others, like *V. fragrans*, are borne in the early summer and are soon eaten by the birds. One of the important things to be noted is that there are three yellow-fruited varieties which should be used more and grown more by nurserymen, because of the very interesting combination which can be obtained by using these with the black and red-fruited forms.

A study of the table shows that the heights vary considerably. *V. Lentago*, for instance, is a small tree and can be trained to a single stem when desired. *V. Opulus nanum*, on the other hand, never grows taller than two feet and can be used as edging or in rockeries.

Autumn color

The viburnums are among the best of our shrubs for autumn color, being predominantly red at this time. Some, like *V. prunifolium*, are brilliant red, others, like *V. dilatatum*, are a dull red but still outstanding, others like *V. Carlesii* have a very deep wine-red autumn color sometimes mixed with orange and yellow. *V. acerifolium* has almost a purple autumn color. Of course, to color properly in the fall, these plants must be in certain definite climatic regions (like the northeastern United States) where the climatic conditions are such as to aid materially in producing autumn color.

The following table lists the most important of the viburnums for ornamental use. In the column headed "Time of Effective Fruit" S = Summer, F = Fall, and W = Winter. In the columns "Value of Fruit" and "Value of Flower" those with a line are not particularly outstanding, those with a single asterisk are of value and those with a double asterisk are particularly valuable. The "Zone of Hardiness" in the last column refers to the Hardiness Map in the Bulletin of Popular Information, Series 4, Vol. VIII, No. 12, 61–64. 1940.

Book Review

Merrill, Elmer D. Plant Life of the Pacific World. Macmillan, pp. i–xv, 1–295, *illus.* 1945. Price $3.50.—Although it is scarcely to be expected that any single book can comprehensively discuss the vegetation of a region which contains upward of 50,000 species of plants, the reader of this remarkable volume will agree that its author has come close to accomplishing the feat. From this statement one is not to assume that the subject is presented in any dry or technical sense; on the contrary, this book is eminently readable and, to anyone with the slightest interest in plants, even exciting. Due to the inclusion of a lucid chapter on the principles of botanical classification, to a glossary, and to 256 well prepared text-figures, the non-botanical reader can understand and appreciate every statement in the book. Yet, this is not a book entirely for the novice; actually it will be read with great pleasure and profit by professional botanists, for many of whom the Pacific is a strange area. Certainly no other living botanist can write of this region with the authority of Dr. Merrill.

Following an amusing introductory chapter exploding certain fictions pertaining to the "dangerous" tropical forests, the author takes us on a tour of various ecological habitats (in chapters entitled Plants of the Seashore, The Mangrove Forest, The Secondary Forests and Open Grass-lands, and The Primary Forest). Additional chapters on weeds, cultivated plants, emergency food plants, problems of plant distribution, the significance of local names, etc., round out a surprisingly complete picture of a highly complex region.

This book should be of very particular significance to service men stationed in the Pacific area; it is one of the most distinguished of an excellent Pacific Handbook Series which has appeared under the auspices of *The Infantry Journal*, Washington, D.C. The restricted edition, for the armed forces, is identical in content but smaller in format and paper-bound. Not only service men garrisoning our Pacific bases, but also prospective travelers to the region will find their experiences vastly enriched by a perusal of Plant Life of the Pacific World.

A. C. Smith

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 | December 7, 1945 | NUMBERS 10–11

THE GLENMORE ARBORETUM AT BUFFALO CREEK, COLORADO

THE Glenmore Arboretum is at Buffalo Creek, Colorado in the Colorado foothills. It was started twelve years ago when its owner decided to landscape his summer residence with native plants. A number of native plants which were available at local nurseries were purchased and a few trees and shrubs were collected from nearby locations.

The next spring it was decided to add, to the collection of native plants, as many different types of evergreens as could be obtained, whether native or not. All types that were offered by local nurseries were trucked to Buffalo Creek and numerous exotics were ordered by mail. Little attention was paid to soil or location and the following spring it was discovered that even though the Colorado mountains were covered with evergreens, not all evergreens were hardy there, and that even the natives required different treatment from that which had been accorded.

Information relative to the proper planting practices was readily obtained, but curiously enough it seemed that no one had ever made any systematic endeavor to ascertain just what evergreens are hardy in Colorado. It was decided to conduct experiments along this line.

During the fall and winter a library on evergreens was started, a good deal of studying was done. Buffalo Creek is but twenty miles from the Continental Divide where the eternal winds distort the limber pines into grotesque shapes and the protracted low temperatures furnish but the briefest of growing seasons. Even at Buffalo Creek, with an elevation of only 7000 feet, high winds are invariably present in the spring and annual minimum temperatures range from -25° to -35° F. Often there is little snow in the winter and in the spring alternate freezes and thaws kill all but the most sturdy of plants. The soil is a disintegrated granite

with very little humus. Lacking adequate browse, the deer pruned most of the junipers and disbudded all exotic pines. Never having been told that pruning should not extend into old wood, a great deal of damage was done.

Peter Rabbit also found buds and tender shoots to his liking.

To improve the soil, an area was manured, plowed and planted in soy beans, and these were turned under while green. At the suggestion of the Supervisor of the U.S. Forest Service Nursery at Monument, Colorado, this area was fenced with a fine mesh wire (one-third inch) eighteen inches high and buried six inches beneath the surface. Above this was stretched two feet of rabbit wire, and above that, a couple of strands of barbed wire. Subsequent experience has indicated that this is the only feasible method of excluding rabbits and mice. "Repellants" have proved but appetizers. The deer, of course, hop over this fence when so inclined. The extra effort required, however, has thus far proved a decided deterrent.

The following spring, permission was secured from the Denver City Nursery to use a few frames and the more doubtful items which were purchased at that time were planted in these more favorable surroundings. (Denver's annual minimum temperature is a good ten degrees above that of Buffalo Creek and soil and wind conditions are better, too.) Lath shading was kept on these Denver frames for a year and the same protection was furnished the new trees that were planted at Glenmore. They were regularly watered at both places.

Some years later a frame for propagation by seed was added at Buffalo Creek and the Denver City Greenhouse lent a bench for experiments in vegetative propagation. Out of all these faltering experiments and subsequent additional ventures, three main purposes have finally evolved:

1. To establish at Buffalo Creek an arboretum composed of native plants and such evergreens (native or foreign) as will live there.

2. To ascertain what evergreens are hardy under normal Colorado conditions.

3. To perpetuate, through vegetative propagation, evergreens that are noteworthy because of their appearance or their hardiness.

Although cuttings are placed in sand at the City Greenhouse each December, the vegetative propagation is carried out for the most part through the medium of commercial nurseries that handle custom grafts and cuttings. Each December scions are taken from noteworthy trees that have been observed during the preceding year. A false cypress that has no business even staying alive in Denver has, for some reason, actually flourished for ten years. Its tips are sent away for grafting. The aphis that travel from Douglas fir to spruce for some reason leave a given tree entirely alone. Possibly grafts from it may have the same immunity. Fastigiate junipers and pines are sometimes found in the hills, and perhaps, their useful ornamental form may propagate true. Grafts from a "weeping" spruce may themselves weep. The Glenmore Arboretum has a golden Colorado spruce, which was noted among several hundred thousand normal seedlings at a local

nursery a few years ago. A cynical wife insists it is but a "peroxide blonde" because this same nurseryman sold some "dwarf ponderosa pines" a few years ago that turned out to have knots tied in their seedling trunks, just below the surface of the soil of the pots in which they were planted. Two of these "dwarfs" were even proudly sent to the Arnold Arboretum! However, the "peroxide blonde" has kept her amazing color in her new surroundings for almost three years now. Its scions will be grafted this winter.

The functions that were first named are the ones most stressed, however. Exotic evergreens that can "take" Denver's occasional winters of −20° Fahrenheit, its alternate freezes and thaws each spring, with little snow protection, and its burning sun and high winds—such evergreens are probably pretty hardy everywhere. If, in addition, they can survive the additional rigors always present at Buffalo Creek, then a very worthwhile test has been given.

Although originally all of the experimenting was done at Buffalo Creek, now it constitutes the secondary stage. Each year there are purchased and placed in the Denver frames evergreen transplants from various locations, the annual minimum temperature of which runs at least as low as −5° to −10° (Rehder's Zone V). These trees are kept in the Denver frames for two years, the first year being under lath screens. Half of those that survive are taken to Glenmore and are there put in nursery frames for two years, again having lath protection the first year. The other half of these specimens are planted in open nursery rows in Denver, where they will get cultivation and water. At the end of another two years further transplanting is done. Those that have lived for two years in the Buffalo Creek nursery frames are put in open nursery rows at Buffalo Creek and half of those that have lived in the open nursery rows in Denver are then taken to the open nursery at Buffalo Creek. After two years in the open nursery at Buffalo Creek they are transplanted to permanent locations and if they survive a couple of reasonably rigorous winters in their final location, it is felt that they are "good prospects."

Of course, no decisive test can be made in a time as short as this. The winter of 1944 and the spring of 1945 were the most trying that have been experienced at Buffalo Creek. A virtual drought from August to December, and practically no snow between December and April created a condition that even the native trees found little to their liking. Colorado spruces and limber pines that had been transplanted to their permanent locations as much as six years ago died. Mountain common juniper growing naturally died in great quantities. Japanese larch killed almost to the ground after three successful years in the open nursery. (If larch sap could be used as a rodent repellant it might be successful. Not one larch bud has ever been eaten, even during the years of worst famine.)

During these twelve years a card index record was kept on every evergreen that was planted. This record will, perhaps, be the most valuable contribution

to horticulture of the Glenmore Arboretum. For the statistically inclined, a summary of the Buffalo Creek burials is appended.

Growth is incredibly slow at "Glenmore." Once a tree leaves the nursery, life is harsh. The earth ball has good soil in it and native grasses discover this almost immediately. Probably the additional moisture that is given after transplanting attracts these hungry marauders. Whatever it is, by the end of the first season any tree that has been planted even near sod has all it can do to stay alive. If it does stay alive two or three years it still may not be able to subsist on the native diet, once its roots have gone beyond the earth ball.

There are high spots, however. Juniper blight is never known in this dry atmosphere. Red spiders are infrequent and scale is seldom present. Spruce gall aphis are always present, but are not too bad. The pine tip moth comes every now and then, but seems to prefer conditions along the roadsides.

From the lists appended it will be noted that the great majority of varieties attempted at "Glenmore" are clons. The number of species that are happy in Colorado—particularly at Buffalo Creek—are relatively small. Even the sturdy eastern red cedar has a much harder time than its western cousin, the Rocky Mountain juniper.

The Rocky Mountain juniper is truly a splendid tree in Colorado. As it is very variable, at least in youth, forty-five distinctive clons have been secured. It will be interesting, long after the present owner is dead, to see if these variants in color, form and texture eventually arrive at the somewhat typical pattern shown in the cut below.

The Colorado native evergreens have made great contributions to ornamental horticulture. The bristlecone pine, bizarre in youth and picturesque at maturity, has few, if any, rivals for naturalistic planting. (Unfortunately this tree has not thus far proved successful in eastern locations.) The common Douglas fir of Colorado is highly prized everywhere. It is one of the "common" trees at "Glenmore." The Colorado spruce in its striking blue and silver shades is becoming almost ubiquitous, while the white fir of Colorado has no rival in its genus for general landscaping purposes and should be used even more than it is.

The deciduous trees and shrubs at "Glenmore" are, as has been stated, restricted to natives, for the most part, because that group has not been explored by local nurserymen as much as the deciduous exotics have been. These deciduous natives, when put upon their own, grow with incredible slowness. And that constitutes the one great drawback to a Colorado Arboretum—life is seldom more than threescore years and ten.

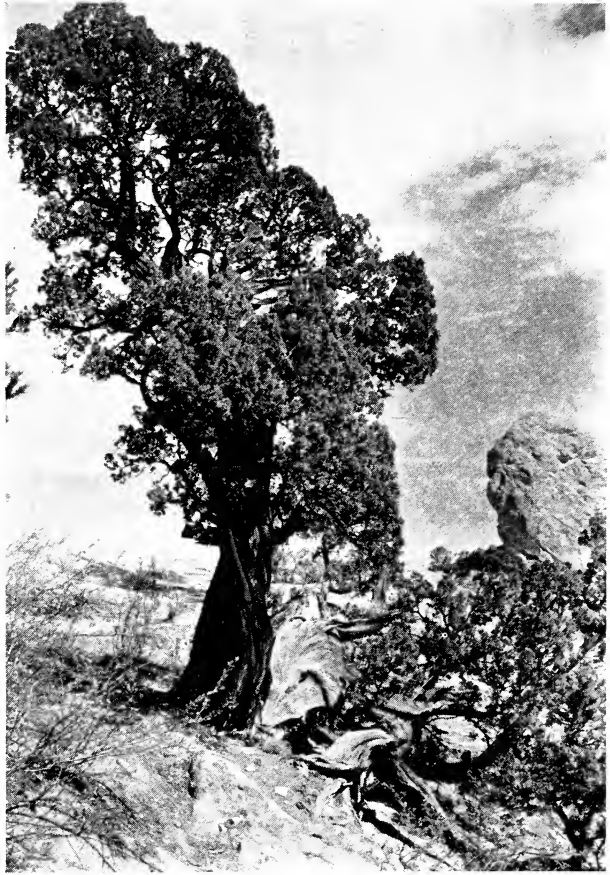


PLATE XIII

The weeping variety of the Colorado spruce, *Picea pungens.*

A Rocky Mountain Juniper, *Juniperus scopulorum.*

EVERGREENS TRIED AT GLENMORE ARBORETUM

Two hundred and fifty two species, botanical varieties and clons of evergreens have been tried at Glenmore. These have been divided into the following eight tentative groups.

I. Hardy in Denver and Buffalo Creek

Abies concolor (difficult to get started)
" " brevifolia
" " conica
Juniperus chinensis "Compact Pfitzer"
" " "Hetz"
" " Pfitzeriana
" " "Pfitzeriana aurea"
" " Sargenti
" " "Silver Sargent"
" communis saxatilis
" " " "Compact"
" " " "Dense"
" " " "Erect"
" " " "Lewis"
" " " "Prostrate"
" horizontalis "Wyoming"
" monosperma
" " "Silver"
" Sabina
" " "Russian"
" " "Russian No. 4"
" " tamaricifolia
" " "tamaricifolia erecta"
" " "Von Ehron"
" scopulorum – (clons of this have all proved hardy, those in bold face type being especially fine)
" scopulorum argentea
" " "Blue Heaven"
" " "Chandler Blue"
" " "Cologreen"
" " "Column"
" " **"Communis type"**
" " "Cone"
" " "Dewdrop"
Juniperus scopulorum **"Emerald"**
" " "Fastigiate"
" " "Funalis"
" " "Gareei Spreading"
" " "Glenmore Globe"
" " **"Glenmore Queen"**
" " **"Gray Gleam"**
" " "Green King"
" " "Green Queen"
" " "Hall"
" " "Hilborn Globe"
" " **"Marshall"**
" " "Marshall spreading"
" " "McCoy"
" " **"Moffett"**
" " "Montana"
" " "Morrison"
" " "Northern Beauty"
" " **"Pathfinder"**
" " "Raleigh"
" " "Scraggy"
" " **"Silver Beauty"**
" " "Silver Column"
" " "Silver Cord"
" " "Silver Globe"
" " "Silver Spreader"
" " "Stove Pipe"
" " **"Sutherland"**
" " **"Table Top"**
" " "Tepee"
" " "Tolleson Weeping"
" " "Weir"
" " "Welch"
" " "Winter Brown"
" " "Winter Green"
" " "Wyoming"

Juniperus utahensis (not as sturdy as *J. scopulorum*)
Larix Gmelini
Picea Engelmanni
" " argentea
" glauca densata (sometimes scorches a little)
" pungens
" " "Buffalo"
" " compacta
" " "Fan"
" " glauca
" " "Glenmore Golden"
" " "Hill Golden"
" " "Hudson"
" " kosteriana
" " "Moerheim"
" " "Redskin"
" " "Turkey Creek"
" " "Weeping"
" " "Weeping Silver"
Picea pungens "Wellington"
Pinus aristata
" Banksiana (difficult to start)
" cembroides edulis (this occasionally burns particularly the first winter after transplanting)
" contorta latifolia
" flexilis
" " "Fastigiate"
" " "Long Leaf"
" " "Short Leaf"
" " "Silver"
" " "Twisted Leaf"
" Heldreichii leucodermis
Pseudotsuga taxifolia
" " compacta
" " fastigiata
" " glauca
" " pendula
" " viridis

II. Hardy in Denver but Questionable or Unsatisfactory in Buffalo Creek

Juniperus chinensis Keteleeri
" communis aurea
" virginiana
" " "Burk"
" " Canaertii
" " "Cypress"
" " glauca
" " globosa
" " "Goldtip"
" " "Hill Dundee"
Juniperus virginiana Kosteri
" " Schottii
" " tripartita
Larix laricina
Pinus nigra
" resinosa
" Strobus (occasionally burns on west side)
" sylvestris

III. Hardy in Denver and Buffalo Creek if protected

Abies lasiocarpa arizonica
" " " "Blue"
Juniperus excelsa stricta
Pinus Cembra
Taxus cuspidata nana

PLATE XIV

Limber pine, *Pinus flexilis*, at timber line.

IV. Hardy in Denver if protected, but Questionable or Unsatisfactory in Buffalo Creek

Juniperus horizontalis plumosa
Picea glauca conica
Pinus densiflora umbraculifera
Pinus Mugo compacta (when once established in Denver, it does well, but often is difficult to start)
Pinus Mugo Mughus

V. Possibilities in both Denver and Buffalo Creek - trees that have done well during a very brief trial

Abies homolepis
Chamaecyparis pisifera filifera
" " "Forest"
" " "Glenmore"
Juniperus chinensis "Armstrong"
" " columnaris
" " japonica
" " " "Dwarf"
" " tortulosa
" communis "nana compacta"
" " saxatilis
" horizontalis "Admirabilis"
" " "Black Hills"
" " Douglasii
" " "Filicinus"
" " "Pulchiness"
(These clons of *J. horizontalis* should be transplanted only when they are very small. They should probably not be exposed to the west sun and wind)
" squamata
" " prostrata
Larix decidua
" sibirica
Libocedrus decurrens
Picea glauca albertiana
" mariana
" obovata
" orientalis
Pinus densiflora
" monticola
" nigra pygmaea
" ponderosa (from the west side of the Rocky Mountains)
" sylvestris fastigiata
Taxus media Hicksii
Thuja occidentalis robusta
" " Woodwardii
" orientalis "Dark Green"
" " "Fairfax"
" " "Fastigiate"
" " "Glenmore"
" " "Krameria"
" " stricta

VI. Questionable Trees - trees that have lived thus far but give indications that they are not hardy

Abies lasiocarpa (hardy in Buffalo Creek, however)
" Veitchii
Chamaecyparis obtusa
Juniperus conferta
Pinus Griffithii
" rigida
Sequoiadendron giganteum (has lived under lath in Denver for three years, but dies quickly at Buffalo

Creek)
Taxus media Brownii
" " Hatfieldii
Taxus media "Wellesley"
Thuja plicata

VII. Unsatisfactory Trees - trees that have stayed alive but in such a manner that they have no horticultural value

Abies balsamea
" holophylla
Chamaecyparis obtusa gracilis
" " nana
" pisifera
Juniperus chinensis (this retains its dead foliage and gets very unsightly)
" chinensis "Dwarf"
" communis Jackii (must be covered in winter to live)
Juniperus horizontalis "Bar Harbor"
" squamata Meyeri (holds dead foliage and gets "leggy")
Picea Abies
" " borealis
Thuja occidentalis (as previously stated, a few trees have been successful and clons from these give promise)

VIII. Trees that have died

Abies alba
" cephalonica
" cilicica
" firma
" Fraseri
" grandis
" Nordmanniana
Chamaecyparis nootkatensis
" obtusa Crippsii
" thyoides (poor conditions, however, will be tried again)
Cryptomeria japonica
Cupressus arizonica
" Macnabiana
Gingko biloba (will be tried again)
Juniperus californica
" chinensis mas
" communis
" " depressa (will be tried again)
Larix occidentalis
Picea Abies argentea
" " Gregoryana
" " Maxwellii
" " nana
" " pygmaea
" Engelmanni "Dwarf"
" glauca
" jezoensis hondoensis
" Omorika
" polita
" rubens
Pinus albicaulis (should be hardy, will try again)
" attenuata
" cembroides monophylla
" Sabiniana
" Strobus nana
" " fastigiata (both these varieties should be hardy in Denver)
" Taeda
" Thunbergii

Pseudotsuga macrocarpa
Taxodium distichum
Taxus brevifolia
Taxus canadensis
" " stricta
Taxus cuspidata (will be tried again)
Tsuga canadensis (this has lived under lath at the Denver City Nursery)
" canadensis "Kelsey Weeping"
" caroliniana

Deciduous Trees and Shrubs - mostly natives of Colorado, all growing very well

Acer glabrum
" Negundo
Aesculus octandra
Alnus tenuifolia
Amelanchier alnifolia
Amorpha canescens
" fruticosa
" " angustifolia
" nana
Apocynum androsaemifolium
Artemisia frigida
" tridentata
Berberis Fendleri
" koreana
Betula fontinalis
" glandulosa
" papyrifera
Ceanothus Fendleri
" velutinus
Celtis occidentalis
Cercocarpus montanus
Clematis ligusticifolia
Cornus stolonifera coloradensis
Corylus cornuta
Cowania Stansburiana
Crataegus species (4)
Eleagnus argentea
Fallugia paradoxa
Forestiera neo-mexicana
Fraxinus pennsylvanica lanceolata
Holodiscus dumosus
Humulus lupulus neomexicanus
Ipomoea leptophylla
Jamesia americana
Lonicera involucrata
Lycium pallidum
Mahonia Aquifolium
" repens
Pachistima Myrsinites
Parthenocissus quinquefolia
Philadelphus microphyllus
Phyllodoce empetriformis
Physocarpus species (3)
Pieris floribunda
Populus acuminata
" Andrewsii
" angustifolia
" deltoides
" Sargentii
" tremuloides
Potentilla fruticosa
Prunus americana
" Besseyi
" pensylvanica
" virginiana melanocarpa
Ptelea trifoliata
Purshia tridentata
Quercus macrocarpa
Rhus glabra cismontana
" " flavescens
" trilobata
Ribes americanum
" aureum
" cereum

Ribes species (3)
Robinia luxurians
Rosa species (4)
Rubus deliciosus
" " "Andrews Double"
" idaeus strigosus
Salix species (11)
Sambucus microbotrys
Sapindus Drummondii
Shepherdia argentea
Shepherdia canadensis
Sorbus scopulina
Symphoricarpos species (4)
Viburnum pauciflorum
Vitis Longii
Yucca angustissima
" baccata
" glauca
" " rosea
" neomexicana

ROBERT E. MORE

Editor's Note:

Mr. Robert E. More, owner of "Glenmore" at Buffalo Creek, Colorado, is an enthusiastic plantsman who for many years has been experimenting with the growing of evergreens. We do not receive much information concerning the growing of ornamental trees in the Rocky Mountain region and that is why we welcome this frank discussion of what Mr. More is doing at "Glenmore." His letters have proved to be so interesting over a period of years that he was asked to record his experiences so that other Arnoldia readers will understand some of the problems in reference to the growing of ornamental evergreens in his area.

Indian Artifacts

An exhibit of special interest has just been installed in the display cases at the right in the vestibule of the Administration Building of the Arnold Arboretum. This consists of about one hundred stone artifacts found by Mr. E. J. Palmer in the Arboretum grounds. The display includes arrow and spear points, scrapers or knives, digging tools, etc., as well as a number of stone flakes or spalls. The presence of the latter indicates that the Indians who inhabited the area actually manufactured their stone implements at their permanent or temporary camp sites, the latter, for the most part, having been situated near one or the other of the small streams that flow through the grounds. Several of these have also been found near the spring across the road from the Rockery. For further information concerning Indian relics found in the Arnold Arboretum, see the bulletin on the subject written by Mr. Palmer. (Arnold Arboretum Bull. of Pop. Inf., Series 4, Vol. II, No. 12, Dec. 28, 1934.)

ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 5 | December 21, 1945 | NUMBER 12

BRITISH GARDENS IN WAR TIME AS SEEN BY AN AMERICAN SOLDIER

DURING the past few years, in connection with my duties in the Armed Forces of the United States, I made several trips to Europe and Africa. Some of the trips were very brief and of these my memories consist of little more than a constantly changing horizon viewed from the deck of a ship. On six of these trips made to the British Isles, I accumulated a wealth of memories, some of them very pleasant, others very discouraging. However, since time mellows most things, already one can view with humor the unpleasant situations and dwell more enthusiastically upon happier moments.

While in Britain my outfit was seldom stationed long in any one place, hence considerable moving about occurred. Although, at the time, this moving seemed irksome because of the total blackout (and it seemed we always moved at night), unfamiliar railway stations, crowded trains, new billets, etc., this very moving provided the means for our greater knowledge of the country, its terrain, people and customs. Now, in retrospect, we are thankful for these many changes.

While in any one place, ample opportunities were afforded each individual to visit localities within a reasonable distance from his base. Many men, naturally, preferred the larger cities and there spent most of their free time. To me, however, the English countryside held more allure and after an occasional visit to the cities to discover that a definite sameness seemed to exist in all the larger commercial centers, I was content to browse around and carry on a feeble bit of botanizing, almost entirely along observational lines.

Several long train trips were made, some from Glasgow or Edinburgh, south through the entire length of England including Wales and vice versa. Of course, one cannot judge the country from a train window but certain observations and conclusions were reached based on this method of travel. We never tired of look-

ing at the countryside and we all felt that even though Britain at that time was being torn apart by war—on the whole, the English countryside was probably one of the loveliest and most peaceful spots in the world. The gorse (*Ulex europaeus*) often brightened the landscape with its yellow flowers either growing wild upon the hillsides or planted along the railways or near stations. In northern England and southern Scotland, walls made of flat stones stretched away over the hills as far as the eye could see, appearing almost as the great wall of China in miniature. These rock-fences enclosed the various fields and pastures. While conversing about these walls, the observation was made, that unlike our American fields and pastures, not a single loose or stray stone could be seen. Thereafter, almost as though it were a game, the men watched the fields carefully and concluded finally that the clean fields and pastures were not mere chance but that the fields throughout all of England had been made clear through effort.

Farther south, hedge-rows replace the stone walls and are used almost exclusively to separate the fields and retain the cattle and sheep. Occasionally, one can see fields edged by hedge-rows which have become worthless for fencing because of neglect in trimming. When such a condition does occur, the hedge can be transformed into a serviceable fence by "plashing." This is done by slashing the main stems half off with a knife and then bending them down and anchoring the branches so as to interlock with the adjoining plants. We saw some of these hedges in southern England a day or so after they had been "plashed." Although they presented a formidable barrier through which no animal would attempt to break, I must confess, at that stage, the rows appeared very unsightly.

When traveling in Wales our train often moved close along the coast. On one side the ocean was sometimes within ten feet. Just a short distance on the other side of the tracks, the terrain arose abruptly, not so very high, but enough to present that strange, somewhat barren and lonely, almost indescribable atmosphere that is so typically Wales, which one must see to appreciate fully. Here on the hillsides one could see gullies filled with snow, yet growing close by would be clumps of bright-colored gorse—or so it appeared from the train.

Our first stay in Wales was brief, consisting only of five bleak days in March. We were billeted at Colwyn Bay which is situated on the north coast by the Irish Sea. The many small hotels, the promenade along the shore and the long metal pier with its pavilion led one to conclude that Colwyn Bay probably was a favorite peace-time summer resort for many people. The city also boasted a public garden which was none too attractive at this time of year. Photographs taken during the summer presented the garden in much better condition.

The Welsh people seemed much interested in us since we were among the first American soldiers to pass their way. They did much to make our stay pleasant. One acquaintance suggested several trips to noteworthy spots nearby and went so far as to check our trains to these various destinations. He even gave us de-

tailed information on how to reach other points of interest and mentioned places where he thought we might enjoy eating.

In two of the cities visited, Conway and Caernarvon, were ruined castles. Conway castle, the first viewed, was old, exceedingly old, and easily the most primitive among "our" castles. We spent considerable time there reconstructing it mentally and in the process withstood many imaginary attacks and prolonged sieges. We rebuilt it and staged gala affairs in the large halls. Unfortunately, in spite of our mental efforts, the castle was still in ruins when we departed! The city itself, in reality a walled city within the castle grounds, is still unspoiled and charming. It was by the merest chance that I found myself standing over the "grave in the Conway churchyard" which inspired Wordsworth's famous poem, "We are Seven."

On a longer trip to Caernarvon, we were fortunate in having a train companion who pointed out numerous places of interest along the way. At this castle we were treated to a "special" tour by one of the guards. Later, in the guard-room we were shown the pictures of the latest investiture of the Prince of Wales, a truly noble piece of pageantry. The destruction of this castle was most unfortunate. It seems that in the middle of the nineteenth century, the castle was abandoned. The townspeople were permitted to remove the castle stones for building their own homes. Later,—but too late—this practice was discontinued and an attempt made to restore the castle to a semblance of its former state. Several other castles were visited at various other times, but these two, because they were our first, will probably always hold a special niche in our hearts.

All things botanical were brought to me, since I was the only botanist in the outfit! Another outfit, which usually moved with us, boasted a zoologist so between the two of us we could answer a majority of the questions "biological."

Recently I was asked what impressed me most in England. There are many things to impress an American, away from home and tired by war. The fortitude and gallantry of every British citizen, after years of privation and war was enough alone to make a lasting impression and to give a moral lift to anyone. Among other things, the endless number of chimney-pots, rows upon rows of them atop all the city houses, the beautiful English countryside and the thatched cottages —all were impressive. However, what impressed me more than anything else was the English people's love for their flower-gardens. It seems, wherever possible, every house has its garden—the larger estates, gardens often of renown—the smaller homes, gardens to fit the space, no matter how small it may be.

Some of the larger estates, like Warwick Castle, have centuries of history and tradition behind them. Their gardens are just as old and historic. In fact, the grounds of the entire estate appear as one huge garden. Like the castle itself, the plans of the grounds were made many years ago. Perhaps a new wing may be added to the castle—perhaps a small change may be made in the plantings—

the over-all picture will scarcely change. I use Warwick Castle as an example because today, despite the war, the castle is alive—the grounds in beautiful condition. A pitiful sight is a similar, perhaps less renowned, estate sinking into the abyss of decay. Taken over by the Armed Forces, the halls resound with alien footsteps of war. Initials appear on the woodwork and balustrades. Windows are broken in. These are nothing—and can easily be repaired! A walk down the garden path shows real destruction. Vandalism—no, they know no better! Trucks have made shorter roads through shrub plantings. Lying on the ground, gasping its last may be a precious gift from the Orient! Nearby construction destroys another group planting. C'est la guerre! C'est l'americain! Wherever possible, however, the British themselves have maintained an excellent standard in their parks. They will deplore the rundown condition, as they term it. Last spring, I visited the public park at Leamington. An extended walk through the grounds proved the place to be in excellent condition. The trees were well-labeled, the grounds well-kept, and the border plots filled with regular rows of tulips and other spring flowers, making a truly brilliant display. The trees were in full flower and the red-flowered varieties of the English hawthorn (*Crataegus Oxyacantha* var.) were at their best. The hawthorn is perhaps England's finest flowering tree. It starts flowering in May and continues into June. At this season of the year one can see the bright spots of pink and rose dotting the landscape.

Another brilliant and colorful display was afforded by the flowers of the many species, varieties, forms and hybrids of rhododendron. Near Warrington in Lancashire is an estate that has the most casual planting of rhododendron that I have had the pleasure to see. Always I had thought of rhododendrons growing only in sheltered places but here they were planted in the open as well as among the trees. I am afraid that I failed my companions miserably when I told them that I could not begin to name all the different kinds. They could not understand why such simple looking plants should be difficult to name—so thereupon I gave them a not too profound "lecture" on species and hybridization. With such ample material at hand—perhaps I was convincing.

The most prevalent gardens in England and, perhaps, the most traditional are the front-yard or door-yard gardens. Each house along the city streets, at least in the smaller cities, has its own little garden. In the country they are termed cottage gardens. This same custom of door-yard garden was brought to the United States by the early settlers and flourished during Colonial times. At that time, the front yard was not for pleasure and children never played there. It was a part more formal than the side or back of the house. I understand that these door-yard gardens originated back in the middle of the 18th century in England when the fore-court was planted to give privacy to the home. Later, it became the custom of the yeomen to have door-yard gardens and this idea, in modified form, has been carried into modern times without general realization of its origin.

PLATE XV

One of the many species of rhododendron for which the climate of England is excellent for growth.

Often the door-yard plot was used as an herb garden. In the United States, this type of garden has long fallen into disuse and been replaced by grass plots with shrub plantings near the house. In England and also in Wales, perhaps unwittingly, this custom has become part of their very life.

Some of the most beautiful front-yard gardens were observed in Wales. These gardens are not merely the whims of individuals, lasting a few years until the novelty wears off and then allowed to run to weeds. The individual gardener takes great pride in the care of his plants even though they may be few and very common. However, one usually finds that over a period of time each garden has acquired one or several unusual species or varieties which have become pampered pets. Even during the trying war years—and I probably saw them at their poorest—these gardens were kept up.

In the rear of the houses where vegetables were planted, perhaps less care had been given to the flower borders that usually surrounded these gardens and greater attention given to the vegetables themselves. It appeared to me that war-time emergency demanded that the people concentrate on cabbage, brussel-sprouts and other variations of *Brassica oleracea* because of the quantity produced rather than the quality. This same was true in the "public" gardens devoted to the growth of vegetables. These latter resembled very much some of our Victory Gardens but appeared more permanent. Over a rather extensive plot of ground, one might see many very small sheds, which I presume housed the tools of the various gardeners. The sheds, in most instances, appeared rather old. All this was merely assumption, since these plots were observed always, it seemed, from the train window. I have recently learned that these are permanent and are termed "allotment gardens" which rent at a very nominal fee of about ten shillings a year. At the same time, I was told that cabbage has always been the dominant vegetable grown in these gardens. Often over a period of time it was the only fresh green that appeared in our mess halls. It was much more coarse in texture and taste than the cabbage to which we are accustomed in the States.

In the very old villages and towns, the houses often were flush with the walk and one could step immediately from the street into the dwelling. One expected no gardens here. However, the windows were usually gay with flowering plants. In the smaller cities, the homes were set back from the street anywhere from ten to twenty feet or even more. Along the street-walk and side of the house customarily had been erected a low concrete wall about eighteen inches high. Immediately behind this low wall might be a hedge. Up to this point there seemed to be a definite sameness. The gardens themselves, however, varied considerably. In some instances, the whole yard became the garden with beds or plots formed by connecting paths. In other places, grass plots served as bases for plantings with flowers in the center and along the sides. Still other patterns were produced by planting the flowers along the main path to the house and a border

along the outside with the hedge as a background. In these instances the entire yard with these exceptions was devoted to lawn.

When one is accustomed to the abundance of floral display found in our American gardens, these small British gardens may at first appear lowly. On further observation one realizes that the British have merely used restraint and individuality in their selections. There may be gardens there as riotous with color and abundance as any found in America only I never have happened to see them. This restraint may be illustrated in the use of the rose. Roses, because of the favorable climatic conditions, flower long and luxuriantly. One might imagine an English street just a shower of rambler roses. Just the opposite situation occurs. As far as I can recollect, the rambler rose, used so extensively in this country, appears more rarely in Britain. The small British garden may boast of one or two fine rose bushes—but what roses! There is an individuality exhibited by each plant. The owner obtained it, perhaps, from some obscure source—or may have produced it himself. It is his very own and he is very proud of it. Some gardens, on the contrary, are almost wholly devoted to roses since it is a very popular plant. I can recall passing daily a garden in Llandudno, Wales, and stopping each time to peer over the hedge in order to admire a particularly gorgeous double yellow rose. At that time, it appeared to be about the only plant flowering in the garden. The owner had observed my interest, I knew, and one day as he stood in his garden, I commented on the beauty of his rose. He was very proud of the plant, and told me that he had produced that particular rose himself. Whether or not he gave all the information to his neighbors also I don't know, but it was the only rose of its kind that I saw in Llandudno. And such is probably the story of many other varieties of roses in the same city block, which incidentally happened to offer especially beautiful roses to view.

Close by, in another yard, I found growing a tall, rather old tree, the monkey-puzzle (*Araucaria auracana*). This again was the only tree of its kind in the vicinity and attracted the attention of the Americans, many of whom had never seen it growing before. I knew immediately when one started to say, "I saw the strangest tree today—" just where he had been in town and to which tree he was referring.

During a period of a few weeks we were billeted in private homes in Llandudno. This city, erected on a point of land almost completely surrounded by water, is one of the finest vacation spots in North Wales. We learned to know the people quite well—and the surrounding country became the scenes of our hikes, some enforced and others for pleasure. One evening while strolling along the promenade we discovered a statue erected in memory of Lewis Carroll, renowned author of the widely read "Alice in Wonderland." The statue was fittingly placed at the far end of a wading pool for children, at that time used for an Emergency Water Supply. One could easily imagine on examining the caves on Great Orme

and the nature of the shore-line just how and where Carroll got his whimsical ideas for his ever-read books.

While roaming on Great Orme, a high rocky cliff, along the shore just outside of Llandudno, I was amazed to find growing in solitary grandeur, a species of cotoneaster. My first thought was that it was an escape, but frankly I couldn't understand whence the species could have escaped up there on that lonely spot. Since then, I have been told that it is *Cotoneaster integerrima* and happens to be an isolated station for the species. On the journey down the shore-drive back to the city we were amazed to find thousands of gulls nesting high on the cliffs over our heads. Such an inquisitive group of birds! They had elected to build their nests on the very edge of the cliff, so that they could observe passersby by merely craning their necks over the side of the nests with the least effort. Immediately, as we came into view, the birds set up a raucous din with their exchange of calls.

While at Llandudno we saw some of the Welsh gardens at their finest. Used extensively, but modestly, was the lupine (*Lupinus polyphyllus*). Here were beautiful blues, some shading from deep blue at the base to near-white at the top of the spikes, others deep blue the entire length of the inflorescence. Red variations were likewise found in abundance and some plants had a combination of red and blue. Another favorite was stocks (*Matthiola incana*). This species appeared as the most commonly used flower at that period of the year. The sweet-William (*Dianthus barbatus*) in white, pink, scarlet or deep red was grown along with the true carnation (*Dianthus Caryophyllus*). I was surprised to find the latter growing in the yards in such excellent condition. Also used was the wood-anemone (*Anemone nemorosa*) and columbine (*Aquilegia vulgaris*). Occasionally, in the corner, perhaps near the house, could be seen a small tree of laburnum or golden-rain with its cascades of bright yellow flowers. When admiring this tree, one was always informed with a sort of solemn triumph that the tree was poisonous!

Another spring was spent in Wiltshire, Somerset, and Warwick Counties. In the very early spring we were stationed near Lavington and Devizes in Wiltshire. One February day while on a walk, a companion and I happened to stroll through a small village near Erlestoke Manor. This little place was composed almost entirely of homes with thatched roofs. I neglect to say cottages because some of the places were homes of more than a single story. Some houses, even though quite large and seemingly more modern were very old and one could see that the nails when used were hand-fashioned. The homes alone were intriguing. One little place interested us more than all the others because of the gem of a garden before it. We spent considerable time looking at the brilliant-colored crocuses, the snow drops (*Galanthus nivalis*), the grape-hyacinth (*Muscari racemosa*), a few daffodils, a small bush of jasmine (*Jasminum nudiflorum*), a few perky primulas, and finally a small stiff-branched bush, about eighteen inches high, of *Daphne Mezereum*. The owner, who happened to appear, gave us a sprig of daphne be-

Courtesy of the Massachusetts Horticultural Society

PLATE XVI

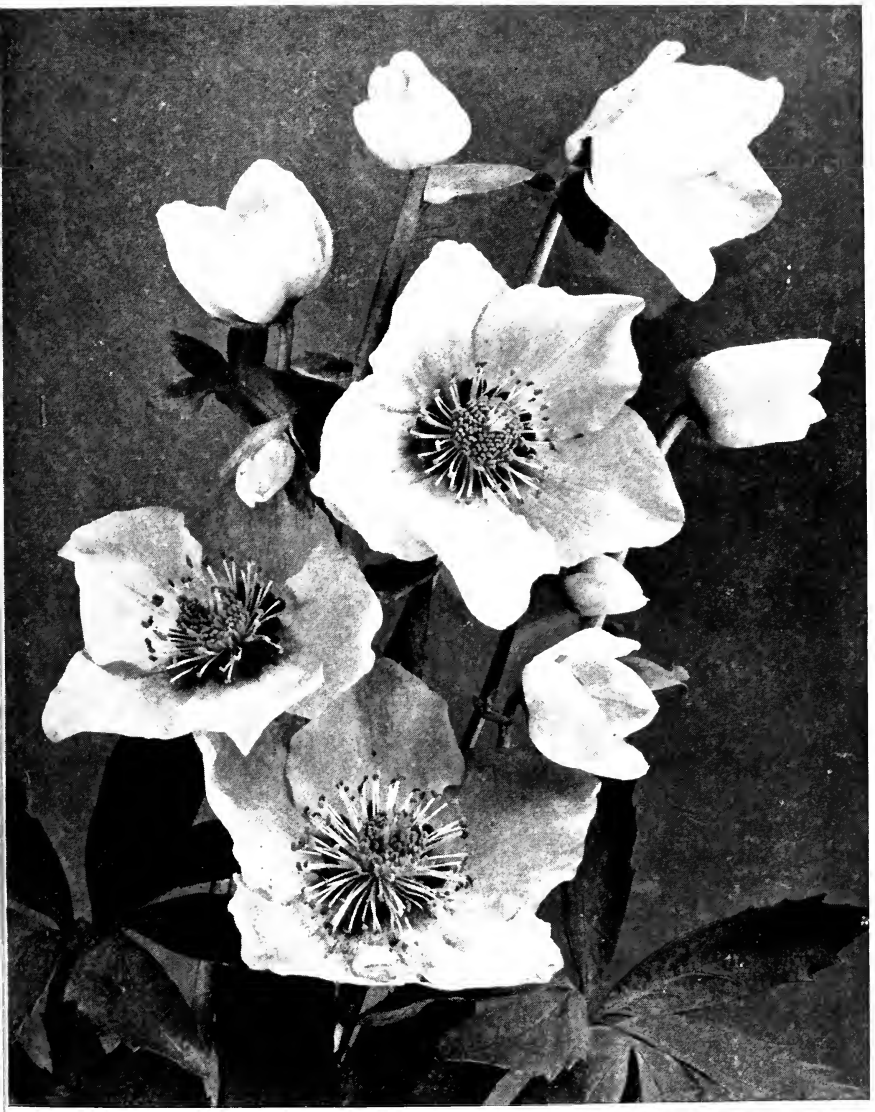
The Cottage garden. A thatch-roofed cottage, often seen on the English countryside, surrounded by its garden.

cause I wished my companion, who had never seen nor heard of it, to enjoy the fragrance. The owner remarked that most people considered it too stiff! It did appear a bit awkward and bristling when he drew attention to its growth. However, few plants produce such an exquisite odor outdoors at that time of year. And as my companion remarked, "I don't blame the poor plant. I am stiff with the cold myself." This little garden was one of the most beautiful I have ever seen—and in February!

Another winter flowering plant which pleased me much but which I saw infrequently was the Christmas-rose (*Helleborus niger*). Oddly enough, the first time I saw the flower was Christmas day. We had arrived at our first base in Britain the afternoon of the previous day, Christmas eve, after a long train trip of nearly forty-eight hours. We were a very dismal looking, disgruntled group of soldiers when we finally arrived at our base in the Midlands. We had left the Queen Elizabeth in the Clyde early in the afternoon of December twenty-second and through a confusion of orders, were shipped to the very southwest tip of England, only to find we were unexpected and unwanted. After a long two-hour wait in the dark and cold, we again entrained and started back to our original destination, arriving there on Christmas eve. Much time was consumed in hurriedly getting established before dark. During the night, the feeble fire in our tiny stove went out and Christmas morning found us shivering, a trifle apprehensive and discouraged. A couple of us decided that it was warmer outside than within the hut and since we had not been assigned to duty yet, we would stroll about the grounds of a nearby estate. Here we found growing—and in full flower—the Christmas-rose. I had never seen it before but recognized from the descriptions the beautiful white flowers which were tinged with pink. I remembered enough about the plant to explain that the showy portion was the calyx and not the corolla. My companion thought it was very auspicious that we should find the flower on Christmas day.

There is considerable folk-lore associated with the Christmas-rose. It was used by the ancients to purify their houses and hallow their dwellings. They also believed that by strewing or perfuming their living quarters with the plant, they drove away evil spirits. In the same manner they blessed their cattle with the plant to keep them free from spells of the wicked. The people would first pray to Apollo and Asklepios (the Greek god of medicine) for leave to dig up the root. Later, the Christmas-rose, with its delicate white flowers was dedicated to St. Agnes—and most appropriately, since she was always regarded as a special patroness of purity.

The same day, while walking to a nearby village, we observed one of the finest pieces of camouflage it had been our privilege to see. Pausing at the top of a hill, we looked down at a tiny village sleeping in the valley. Not a person was in sight. The other side of the valley appeared as a green and brown plaid, pat-



Courtesy of the Massachusetts Horticultural Society

PLATE XVII

The Christmas-rose (*Helleborus niger*) flowering in English gardens during December and January and traditionally used at Christmas.

terned by many fields and hedges. The unploughed fields were all very green but one appeared a trifle more so than the others. We pondered on the sight and wondered what might be planted there. Later, on closer observation, we discovered that it was a huge building for some war use, artfully camouflaged to match the nearby green fields.

Later in March and April, on still another trip, we were stationed near Taunton in the southern part of England. The houses here were neither the thatched type noted previously nor the street type of the cities, but semi-modern so-called detached houses along the road. Here the same love of gardens was found, but more individual. Flagstone walks up to the house formed the basis for planting. Here also we saw some larger homes with walled-in gardens of corresponding proportions but carrying out the same general effect of the smaller gardens mentioned above. Fruit trees were in flower. The display seemed rather feeble compared to our own abundant fruit orchards.

The following month found us again in the Midlands near Birmingham. From this base we visited Kenilworth, Warwick and Stratford-on-Avon. The last named place is a pilgrimage for all Shakespeare lovers the world over and I became one of the millions who have paid tribute to the bard. The townspeople did everything to make our stay there pleasant, showing us all things relating to Shakespeare and his family. In the rear of one of the Shakespearian Museums is a garden devoted to the growing of the flowers mentioned by Shakespeare in his works. In late May, it was an excellent display but little time was permitted for a prolonged tour to examine the various plants. So many of them I did not know. This was in early May, 1944.

Everything eventually comes to an end—and so it was with the war in the European Theatre of Operations and my various stays in Britain and on the Continent. At the time, I felt very weary and worn and was glad to dash up my last gang-plank at Southampton and take one last look at the coast as our ship faded into the night and the English Channel. I had traveled enough—and would be glad to settle down in the States forever! As I mentioned earlier, time mellows everything and I already begin to feel the urge to go back to see how differently Great Britain will appear in time of peace and to check up on things I am doubtful about—as well as to meet again some of the friends I have made in a foreign land.

C. E. Kobuski

INDEX TO VOLUME V

Illustrations are in **bold face** type

These bulletins will be discontinued until Spring of next year. Subscription renewals for 1946 are now due, price $1.00 per year. Checks should be made payable to Harvard University, Arnold Arboretum, Jamaica Plain 30, Mass.